MANUAL OF COST ACCOUNTS

BY

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(HONOURS), FELLOW OF THE CHARTERED INSTITUTE OF
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PREFACE TO FIFTH EDITION

In presenting the Fifth Edition of the *Manual of Cost Accounts* the increasing interest in modern costing methods observable in many directions may be noted

Recent tendencies in modern costing theory run more and more in the direction of determining standard theoretical costs, in accordance with which manufacturing programmes are laid out The constant dissection of expenses then aims at tracing and preventing departmental losses and suggesting economies by improved and specialized machinery

The tendency towards larger manufacturing organizations in the form of combines and associated factories compels attention to very careful comparisons of costs in the preparation of which the most exact methods are called for In such cases the consequences of delay, inaccuracy, or wrong interpretation in the presentation of costing reports may be very far-reaching , and in the event of omission to appreciate any such indications as a need for drastic retrenchment of excessive overhead charges or a reorganization of unremunerative departments, the ultimate results may be disastrous

The importance of cost statistics thus becomes increasingly evident , their value when up to date, clearly set out, and in sufficient detail is inestimable to every progressive manufacturer

H JULIUS LUNT

Manchester
January, 1930

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MANUAL OF COST ACCOUNTS

CHAPTER I

INTRODUCTION

THE subject of Cost Accounts has come into prominence in recent times because of the increased interest in more accurate methods

A United States Government Committee has made an official inquiry into the subject and states that "an amazing number of manufacturers, particularly the smaller ones, have no adequate system for determining their costs, and price their goods arbitrarily" Probably in this country less than 10 per cent of the manufacturing firms have an efficient system of Cost Accounts

Many manufacturers are content to have a periodical Trading and Profit and Loss Account which merely shows the result of their operations as a whole From these accounts, however, nothing can be learnt as to any particular work which is making big profit, or as to work which may be entailing heavy loss Transactions of both kinds mingle together in making up the totals recorded in the financial books

In some cases the financial accounts can be arranged so as to classify the expenses in sufficient detail and provide a return of the cost of a standard unit, department or process

A separate system of accounts is required in other cases which must analyse the financial results so as to determine the cost of material used in the manufacture of any particular unit, the wages expended on it, and the other sources of expense which are incurred to bring it to perfection and dispose of it on the market These must be charged accurately against the selling price of each unit so that the profit and loss can be ascertained

It is the object of *financial accounts* to obtain and maintain accurate records of the transactions and results of a business, in the most direct manner possible and with a minimum of detail

Contrasted with this view of affairs is the standpoint of the manufacturer or salesman requiring to estimate for future work, and having to regard each separate sale as a possible profit or loss according to the price he offers In fixing such price he must not be so high as to lose the order nor must he be so low as to lose his profit

In merchanting, where goods are sold substantially in the same form as when purchased, little difficulty arises because the mere addition of a percentage is sufficient to cover the known establishment expenses Fluctuations of market must be watched, but there are few opportunities for sources of leakage, as, for example, wages paid without adequate corresponding return This may occur easily in a manufacturing business, especially in the case of indirect or non-productive labour

In large businesses, where vast sums are laid out in the purchase of materials and payment of wages, it is essential that each lb of material, or each hour of time, should be traceable so that it may ultimately be charged to a particular customer, who, at the time when the outlay is made, may quite possibly be unknown

Further, in order to control the work that is put in hand, and to organize it to ensure that it must prove profitable, very great detail in the records will be essential

The aim of a manufacturer in seeking profits must always be to conduct operations on lines of the highest efficiency, thus obtaining the *maximum product* for the labour expended, which is not the same thing at all as the payment of the lowest wages Correct costing means *high efficiency* with high wages and a minimum of *unremunerative* labour

An economically managed factory receives the bulk of the orders by reason of the fact that it is able to tender on a competitive basis, to cut the price, at the same time ensuring a fair profit, and to execute the order with confidence and speed An economically managed factory is not necessarily one in which low wages and salaries are paid Experience has proved that the reverse is often the case

It is further noticeable that a sound costing system plays an important part in works organization and expense control When the factors which are causing expense can be localized and scrutinized, it becomes possible to obtain considerable economies which are not brought to light in a works where there is no system to make someone responsible at each stage

The outlay of capital, whether permanent as in buildings and plant or circulating as in materials and wages, can be controlled in detail by means of Cost Accounts, here are recorded all details of raw material, its use, its value from time to time, what labour is spent on it, and the expense incurred until the commodity emerges as a finished and saleable product

Method of Presentation.

The method of presentation of cost results is also important It is obvious that little or nothing can be learned from a ledger record of the results, representing profits or losses on innumerable jobs There must be a periodical tabulation of results, comparisons of the cost of like jobs with one another, comparisons of all jobs with estimates and regular management reports based on the information thus obtained

Relationship with Financial Accounts.

It is essential that close relationship should exist between the costing and the financial accounts A sound system and regular comparisons will ensure agreement between the results shown in the two sets of accounts, and the value of the cost results is enormously increased when this agreement can be demonstrated, so that continuous cost records and not merely occasional tests should be maintained Where for detailed results reliance has to be placed upon occasional tests, the accounts should be so arranged as to provide a means of comparison and check upon such data

The control of the cost system by means of a Cost Ledger (or Work-in-Progress) Account in the financial books can be strongly recommended on these grounds

Costs and Estimates.

Cost Accounts also differ from estimates, they are historical records and are useful in preparing estimates of future costs, which, however, are of the nature of forecasts, being based on expectations of market changes, wages fluctuations, and expense variation

The chief points of difference are—

Estimates are based upon—

1 Market quotations,
2 Expectations as to price fluctuations,
3 Labour rates, and
4 Expense rates current at time of quoting
5 Estimates may be given regardless of profit to secure business

Costs only take note of actual price paid for material used and wages paid, actual expenses current at time of execution

The true place for cost records in regard to estimating is that they form a reliable history of past work from which future plans may be formed by taking into account alterations in any or all of the factors

Estimates cannot be prepared from the general financial returns in a business handling a variety of products, with the same exactness that is obtainable when Cost Accounts are kept, and thus over- or under-estimating is inevitable

It is only necessary to mention that under-estimating leads to unprofitable work, and over-estimating means loss of profitable orders, to see the double evil that may ensue

Costing Methods

The unit of work or production may be a ton of coal at a colliery, a sack of flour at a flour mill, or a ton of steel at a steel works In such cases a method of *Single Cost* may be used

To meet the case of Railways, Tramways, Carriers and similar businesses rendering services rather than producing goods, the method of *Operating Cost* applies This method is on similar lines to Single Cost, but with a unit of a train-mile, wagon-mile, car mile or ton-mile, as the case may be with a system of expense classification following the organization of the operating and maintenance departments

By another method a factory may be divided into departments, in each of which there is a separate unit of production In such cases, in order to frame a Cost Account system, the first step is to provide separate *Departmental* Trading and Profit and Loss Accounts

The unit may be a ton of oil at an oil mill, a piece of cloth at a print works, or a ton of hydrochloric acid at a chemical works In these cases a method of *Process Costs* is used, by which the cost of each process through which the material passes will be shown

The unit in the case of a builder and contractor is the contract undertaken Each separate contract must have an individual account showing its profit or loss This is the method of preparing Cost Accounts for each job, and is known as *Terminal Costs*, because each unit of work proceeds independently of the others, whether it be a house or works in the case of a builder or a railway bridge or steamship in the case of a contractor

The most complicated costing work is found in an extensive works making numerous types of machines The processes are carried on regardless of the particular article for which the work is ultimately intended, and material passing through the same processes will ultimately be found made up into machines of different capacity, design, purpose and value

This method is termed *Multiple Cost*, and it is a development of the principle of charging costs to each job, and is applicable to a great variety of trades

In large works many costing systems are in use in different departments, the means being adapted to suit the work At some stages short cuts will be possible and it is part of the Cost Accountant's methods to introduce systems which will eliminate some of the detail of individual Job Costing and give correct records

What Cost Accounts Show

Cost Accounts are accordingly adopted in manufacturing businesses, and give an analytical view of the same records as are condensed in the financial accounts, so as to show the cost of production per unit of work turned out They serve as—

1 A record of results for statistical purposes, forecasts, and for obtaining interim Profit and Loss Statements and approximate Balance Sheets

2 A guide for future estimates, quotations, and for price-fixing, especially when output may be dependent upon price limitations

3 A means to reducing cost of production by economies in design, methods and equipment, or by obtaining increased output

4 A means of control for detecting losses, waste, unremunerative expense and for improving organization

It is essential that such accounts be *accurate*, otherwise the value of the results is clouded by uncertainty They must necessarily be detailed, and the usual difficulty is to obtain sufficient detail without incurring great expense in salaries On this account every opportunity must be sought to adopt abbreviated methods and to eliminate duplication At the same time it must be borne in mind that in practical application, the cost of running a sound costing system is repaid many times over by the economics which it will effect

Great difficulty arises in fairly allocating indirect expenses and the circumstances governing every particular case must be carefully studied

Accountants must be able to recommend the principles upon which the costing system for a particular business can most suitably be framed, and to draw up, in connection with the technical managers, the detailed accounts, schedules, preliminary records and other details which may be required, also to recommend improvements in methods of routine, particularly with the aim of securing greater accuracy and promptitude in the returns obtained from the costing system, and to advise upon various systems

Bonus schemes are likely to play an important part in future arrangements of industry The success of such schemes is closely bound up with the working of the costing system, for it is only by intelligent appreciation of economies in working, that a degree of efficiency can be maintained under keen competition which will ensure regular and substantial profits in any trade, and the production statistics obtainable in the Cost Accounts will be of vital assistance in such matters

It is impossible to make the working of any business fit into a ready-made costing system The system must be adapted to suit the business In every case forms suitably ruled, and specially drafted schedules for accounts and record books will be required These must be intelligently prepared to suit the circumstances in each case

It is with the object of providing a summary of the main principles of this subject that this book is issued, and it is hoped that it may meet the needs of students and afford some assistance to others seeking guidance on this complex subject

CHAPTER II

DEFINITIONS

SINGLE (OUTPUT) COST is applicable to businesses supplying a uniform product where the object is to ascertain the cost per unit obtained

DEPARTMENTAL COST is the method employed to ascertain the profits of departments of a business

PROCESS COSTING is used to ascertain the cost of each stage of manufacture where material is passed through various operations to obtain a final product or result, with by-products in many cases at different stages

JOB COSTS are employed to charge the cost of production against the different jobs that are undertaken

TERMINAL COSTS are employed to show the cost of carrying out contracts and undertakings which are by their nature entirely separate and are terminated by the completion of the work

MULTIPLE COSTS apply to businesses where the products differ widely in type, value and complexity, where similar operations may be used to give widely differing ultimate results, where specialization and the standardization of parts may be extensively adopted

OPERATING (WORKING) COSTS apply to businesses carrying on services rather than producing goods

PRIME COST (or FLAT COST) is the cost of material used and labour expended directly in producing an article, completing a piece of work or carrying on a service

DIRECT MATERIAL is the material used in the manufacture of an article, or in the construction of an undertaking which can be charged specifically to the job, including·

(*a*) Direct purchases which can be allocated to the job from the invoice

(*b*) Stores material which is withdrawn from general stores to be charged to specific work

INDIRECT MATERIAL comprises all materials which are not capable of being allocated to specific work

DIRECT LABOUR (also termed Productive labour) is labour which is expended specifically upon the construction of an article, and may be skilled or unskilled It is differentiated from

INDIRECT (or Non-productive) labour engaged upon general services connected with the running of a factory as a whole

CHARGEABLE EXPENSES are those which can be allocated directly to specific jobs

ESTABLISHMENT CHARGES, signifying Indirect Expense, may be divided into Works Expense, Office and Administration Expense, and Selling and Distribution Expense

WORKS EXPENSE is that expense which is properly concerned with the running of a factory or plant, and is embraced in the cost of production , it will include Expense of Works Management and Administration

COST OF PRODUCTION is the *Prime Cost* plus the proportion of Works Expense properly chargeable against the production of an article

WORKS COST, FACTORY COST and MANUFACTURING COST signify Cost of Production

ONCOST, also known as OVERHEAD EXPENSE, BURDEN, or ESTABLISHMENT CHARGES, is divided into *Works Oncost*—signifying the charge which is made in Cost Accounts to cover Works Expenses , and *Office Oncost*, signifying the charge which is added to Cost of Production to cover General Expenses

GROSS COST is the Cost of Production, plus the proportion of General Expenses, including Management, Selling, Distribution and Office Expense

DIRECT LABOUR (PRODUCTIVE) HOUR method is the system of charging expenses to jobs on the basis of the hours of Direct (Productive) Labour spent on them

WORK-IN-PROGRESS is the uncompleted work on hand at any time

DEPRECIATION is the inherent wastage in value of an asset due to any cause

STANDING EXPENSE includes Indirect Expense of a fixed and permanent character, e g Rates

INCIDENTAL or FLUCTUATING EXPENSE includes Indirect Expense of a variable character, e g Repairs

PRODUCTION UNIT signifies a common standard in terms of which the output of a works or department may be measured

PRODUCTION HOUR signifies time expended by employees in Direct (Productive) Labour

CHAPTER III

SINGLE (OUTPUT) COSTS

IN the good old days when it was almost undignified to be able to read or write, a builder or shipwright probably had little idea of the cost of his operations except what he obtained by totalling the amount of cash which he had parted with to complete his work If his means increased, he prospered , if not, then it was adversity—and nothing further could be said about it

To-day the conduct of large organizations requiring strict control of vast sums laid out in material and wages and the determination of responsibility for each detail leads to the introduction of complicated accounts In such cases particularly, and in small businesses also, the value of knowledge concerning operations in progress cannot be over-estimated, and it is to provide for this phase of accounting that Cost Accounts come into use

Object of Cost Accounts.

The object of keeping Cost Accounts is to be able to ascertain the cost of any one product, department or process independently of other work going on in the factory at the same time The first gain may be looked for in reduction of waste in material, time and sundry stores , and at the same time a reduction of general expense rates due to better organization and improved output Further, the records of past work form a valuable base for future efforts

The means to be adopted to gain this end must vary in every business In general terms, the following principles will apply and the organization of a costing system in any business must necessarily follow the lines appropriate to its stage of development

Financial Accounts

The Trading and Profit and Loss Accounts may be made to yield much useful information They should be drafted so as to separate manufacturing expenses from administration and selling expenses, so that the factory cost of the output can be obtained

The arrangement of the Trading and Profit and Loss Accounts should be as follows—

(1) Raw Material Accounts to which purchases are charged, the materials used will be credited and transferred to a Manufacturing Account The total amount used in any period is obtained by totalling requisitions for supplies or deliveries of materials, or by taking stock of material still in store and transferring the balance as material used

(2) Manufacturing Account, to which material used, direct wages and works expenses are charged, finished goods are transferred to Finished Goods Account, and work-in-progress remains as a balance

(3) Trading and Profit and Loss Account to which is charged the cost of manufactured goods sold This is obtained from the Finished Goods Account after crediting stock on hand Expenses of selling and distribution and general administration are charged here

Raw materials which directly enter into production and similarly direct wages engaged upon productive work must be accounted for separately from indirect material, e g oil for lubricating machinery, and indirect wages, e g foremen or timekeepers Further, the Expense Accounts must show clearly the cost of each source of expenditure, e g such an account as wages, besides being split up into direct wages and indirect wages must be further dissected in the accounts so that the indirect wages will be grouped as foremen, timekeepers, stores clerks, etc, each group having its own expense account, and in the arrangement of other expense accounts a similar careful dissection will be required

Single Cost

Single Cost is applicable to businesses supplying a uniform product where the object is to ascertain the cost per unit produced, e g per lb of yarn in spinning mills, per yard of cloth in textile factories, per sack of flour in a flour mill, per ton of coal in a colliery, per ton of steel at a steel works

Manufacturing businesses use Single Costs when turning out a standard product, but in most instances a division into departments, each handling a separate range of goods, will be desirable , or a division of the cost of manufacturing a single product into processes or stages of manufacture will be useful In these cases the methods described under Department Cost and Process Cost will be applicable

Where a common basic unit for the whole production can be arrived at, the charges in the Manufacturing Account can be compared between different periods by reducing each item to the cost per unit for the period

In the Trading Account the percentage of each item to the Sales should be stated

The most convenient period for making up a periodical cost sheet must be considered In some businesses a weekly reckoning is made , in others a monthly account is considered adequate , while in other cases a four-weekly period with 13 periods to the year is found most satisfactory, in consequence of the comparison of results not being disturbed by irregularity in the length of the periods

Assuming that a monthly period is to be used, a Monthly Manufacturing and Trading Account will be required

Returns of materials used in quantities and value and detailed record of production form an essential part of this system Material must be priced at actual cost, and wages must be grouped under productive operations to enable comparisons to be usefully made

In addition to values, *returns of quantity* in respect of all products should be made so that the volume of waste and

First Account—

RAW MATERIAL

Wheat Account No. 1 Manitoba

19		£	19		£
Jan. 1	To Stock	2,000	Jan. 31	By Transfer to Manufacturing A/c (at average cost price)	3,500
,, 31	,, Purchases	3,000	,, ,,	,, Stock on hand	1,500
		£5,000			£5,000

Second Account—

MANUFACTURING ACCOUNT

Month of January

19			Tons	£	Net Cost per Sack s.	d.	19		Tons	£
Jan. 31	To Wheat No. 1		220	3,500			Jan. 31	By Trading A/c Flour 43,260 sacks of 240 lbs.	4,635	87,000
	,, ,, 2		620	10,000			,, ,,	,, Offals	1,100	11,875
	,, ,, 3		4,900	81,500				,, Loss in Milling $\frac{1}{10}$%	5	
			5,740	95,000	38	5				
	Direct Wages			2,750	1	3				
	Factory Exps.:	£								
	Wages	270								
	Coal	200								
	Electricity	150								
	Repairs	220								
	Sacks & Sundry Chgs.	115								
	Deprecn. of Plant	170		1,125		6				
			5,740	£98,875	40	2			5,740	£98,875

Third Account—

TRADING AND PROFIT AND LOSS ACCOUNT

Month of January

19		Tons	£	19		Tons	£
Jan. 1	To Stock of Flour	3,090	51,875	Jan. 31	By Sales	6,475	115,000
,, 31	,, Manufacturing A/c	4,635	87,000				
		7,725	138,875				
	Less Stock Jan. 31	1,250	25,000				
		6,475	113,875				
	,, Gross Profit		1,125				
		6,475	£115,000			6,475	£115,000

PROFIT AND LOSS ACCOUNT

		% on Sales	£			£
19				19		
Jan 31	To General Exps viz —			Jan 31	By Gross Profit (= 98% on Sales)	1 125
	Office Salaries	07	85			
	Sundry Exps	03	30			
	Travellers	1	120			
	Advertising	04	50			
	Carriage	3	340			
	Discount	07	75			
	Interest	05	60			
		66%	760			
, ,,	,, Net Profit	32	365			
		98%	£1,125			£1,125

cost *per unit* can be worked out , this cost will be found important in all comparisons

The gross profit must be arrived at—

(*a*) By ascertaining actual value of stocks , or

(*b*) By charging to Manufacturing Account material put in hand and crediting finished stock and estimating work in progress , or

(*c*) By assuming a percentage based on experience

There will usually be a steady relation between quantity of material used and quantity of output and work in progress, but fluctuations in price must not be disregarded

A Monthly Expense Summary should be prepared from the Nominal Ledger, and after suitable adjustment as regards outstanding or prepaid items the expenses for the month are obtained

In the calculation of expenses the monthly quota must not represent merely purchases of stores, e g coal, repair material, oil, etc , but stocks on hand must be taken into account and net amounts consumed only must be charged up

At the conclusion of the financial year the totals of the accounts on these lines will necessarily agree with the financial results

The Trading Results, whether annual or monthly, should be tabulated in parallel columns over a series of periods so that costs can be compared and unremunerative expenses

FOURTH ACCOUNT—

MONTHLY COMPARISON

	Month ending 31st January		Corresponding Month last year		Total for 4 Months since Stocktaking		Corresponding Period last year	
		Cost per Sack		Cost per Sack		Cost per Sack		Cost per Sack
	£	s d	£	s d	£	s d	£	s d
Manufacturing Account—								
Cost of Wheat (*less* Offals)	83,125	38 5	116 000	42 2 4	402 000	42 3 8	522 000	42 7 3
Wages	2,750	1 3	2 500	10 9	10,200	1 0 9	10 000	9 8
Factory Expenses								
Wages	270	1 4	240	1 1	780	1	720	7
Coal	200	1 1	180	8	570	8	550	5
Electricity	150	8	120	5	540	6	250	3
Repairs	220	1 2	250	1 1	450	5	370	4
Sundry	115	6	120	5	120	1	130	1
Depreciation	170	9	180	8	680	9	700	7
	£87 000	40 2	119 590	43 6 1	£415 110	43 6 6	£534 720	43 7 8
Output	43,260 sacks		55,000 sack		190,000 sacks		245 000 sacks	
		Percentage on Sale		Percentage on Sales		Percentage on Sales		Percentage on Sales
Trading Account—								
Sales	£115,000		120 000		£400 000		£550,000	
Gross Profit	1 125	98%	2 910	2 43%	4,660	1 16%	12,260	2 23%
Expenses								
Office Salaries	85	06	80	07	340	08	320	06
Sundry Expense	40	03	50	04	150	04	150	02
Travellers	120	1	130	11	420	11	500	09
Advertising	50	04	70	·06	130	03	70	·01
Carriage	340	3	370	31	1 200	3	1 300	24
Discounts	75	06	90	07	260	06	300	05
Interest	60	05	55	05	240	06	250	04
Net Profit	365	32	2 065	1 72	1,920	48	9 410	1 72
	£1 125	98%	£2 910	2 43%	£4 660	1 16%	£12 260	2 23%

COLLIERY COST SHEET PIT No 2

WEEK ENDING 10TH JANUARY, 19

Coal Worked, 2,000 tons Last week, 2,400 tons

	£	£	£ s d	Per ton	£	£	£ s d	Per ton
UNDERGROUND—								
Wages		1,000		10 –		1,320		11 –
Pitwood		150		1 6		180		1 6
Stores		200		2 –		240		2 –
Horsekeep		80		9 6		120		1 –
	1,430	1,430	14 3 6	14 3 6	1,860	1,860	15 6	15 6
SURFACE COSTS—								
Wages		500		5 –		660		5 6
Stores		150		1 6		140		1 2
Horsekeep		40		4 8		40		4
	690	2 120	6 10 8	1 1 2 4	840	2,700	7 0	1 2 6
DISTRIBUTION COSTS—								
Truck Hire		80		9 6		90		9
Railway Charges		350		3 6		420		3 6
	430	2 550	4 3 6	1 5 6	510	3,210	4 3	1 6 9
ESTABLISHMENT AND OTHER CHARGES—								
Royalties		40		4 8		40		4
Rates		10		1 2		10		1
General Expenses		15		1 8		12		1 2
Bank Charges		4		48		4		4
Commission		40		4 8		43		4 3
Discount		10		1 2		12		1 2
Insurance		15		1 8		15		1 5
Capital Sinking Fund		40		4 8		45		4 8
	174		1 8 88		181		1 6 4	
	£2 724	£2 724	£1 7 2 88	£1 7 2 88	£3 394	£3 394	£1 8 3 4	£1 8 3 4

[Each of the above main headings of expenses will comprise numerous subdivisions showing more detailed dissections] promptly checked. Periodically the Balance Sheet items may be similarly tabulated. The value of such comparative record cannot be over-estimated.

Specimen Cost Sheets.

The Colliery and Steel Works Cost Sheets here shown are prepared similarly from the financial books and production returns. For the setting out of comparisons recourse should be had to the use of graphs showing the results in diagrammatical form.

SUN STEEL WORKS.

WEEKLY COST SHEET

For week ending [illegible]nd November 19

Week's Production—
1,800 tons

Per ton Steel Produced				Total			Per ton Produced		
Cwts. 15·5		Pig Iron	1,395 tons	11,160	0	0	6	4	0
" 4·3		Scrap	387	3,483	0	0	1	18	6
" 2·0		Iron Ore	180	630	0	0		7	0
" 2·0		Limestone	180	180	0	0		2	0
" 8·0		Coal	720	864	0	0		9	6
				16,317	0	0	9	1	0
		Less Sales of Scrap, Mill Cinders and Scale		830	0	0		9	0
				15,487	0	0	8	12	0
		WAGES—							
		Smelting Furnaces and Gas Producer		2,250	0	0	1	5	0
		Ladles and Casting Pits		1,350	0	0		15	0
		Rolling Mills		1,350	0	0		15	0
		Cranemen and Labourers		1,080	0	0		12	0
		Boilermen and Engineers		900	0	0		10	0
		Locomotive Drivers and Yardmen		90	0	0		1	0
		PRIME COST		22,507	0	0	12	10	0
		WORKS EXPENSES—							
		Sundry Stores including oil, waste, millgrease, saw blades		180	0	0		2	0
		Rents and Rates of Works		225	0	0		2	6
		Coal for Re-heating		270	0	0		3	0
		Coal for Steam		675	0	0		7	6
		Gas, Water, Electricity		720	0	0		8	0
		Timekeepers and Store Clerks		45	0	0			6
		Repairs and Renewals		270	0	0		3	0
		Depreciation		450	0	0		5	0
		Royalties		90	0	0		1	0
		WORKS COST		25,432	0	0	14	2	6
		INDIRECT EXPENSES—							
		Management, Salesmen, and Office Salaries and General Expenses, including Interest, per Schedule		2,380	0	0	1	6	6
		Net Cost at Works		£27,812	0	0	£15	9	0

CHAPTER IV

DEPARTMENTAL COSTS

In a business where a single product is turned out, the method of Single Cost can be adopted, but offshoots spring up in course of time, and a successful concern turns out several types of work, or will undertake branches of trade outside its original scope of transactions, e g an engineering business may lay out a foundry or take up electrical work , and in general industrial businesses these conditions invariably apply

In these circumstances there is no single unit of production, and where a business is making two or more clearly defined varieties of goods, it is best to commence the organization of a costing system by splitting up into various departments, for each of which separate records can be obtained It is almost invariably found when this is done that one department carries part of the expenses of, and, maybe, losses incurred by another

Departmental Cost is the method employed to ascertain the profits of departments of a business

The classification of departments is a matter for decision on practical grounds , in some cases the material used may determine the division , in other cases the nature of the machines in use, or the character of the labour employed

It is essential, first, to prepare a detailed schedule of the work done in each of the departments, including also particulars of the stocks held on behalf of each, so that the records do not become confused at different stages

Purchases must be analysed in the Purchase Invoice Book or a separate Purchases Book used for each department

PURCHASE INVOICE BOOK

					RAW MATERIALS			SUNDRIES			
Date	No	Name.	Fo	Total	Silks	Cottons	Woollens	Silks	Cottons	Woollens	Expenses
				£ s d	£ s d	£ s d	£ s d	£ s d	£ s d	£ s d	£ s d

Sales must be similarly analysed in the Sales Book

SALES BOOK

Date	Name	Fo	Total			Silks			Cottons			Woollens		
			£	s	d	£	s	d	£	s	d	£	s	d

Wages must be made out separately for each department, and in the event of some workers having booked time in more than one department, the correct amount must be recorded in each and the total arrived at in a final summary

SUMMARY OF WAGES BOOK

	Gross Wages			Deductions			Net		
	£	s	d	£	s	d	£	s	d
Silks Department Total	125	17	6	3	6	6	122	11	–
Cottons " "	154	3	7	5	13	–	148	10	7
Woollens " "	137	2	2	4	9	4	132	12	10
	417	3	3	13	8	10	403	14	5
Staff—									
Foremen, Storekeepers and Timekeepers	15	10	6		6	6	15	4	–
Engineers	12	14	–		5	–	12	9	–
Office	22	9	6		7	6	22	2	–
	£467	17	3	£14	7	10	£453	9	5

Materials transferred from one department to another must be supplied only against written requests These will be summarized, and a Departmental Transfer Summary prepared to show the departments supplying and receiving respectively

DEPARTMENTAL TRANSFER BOOK

SUPPLIES TO SILKS DEPARTMENT

Week ending	DETAILS	Total			From Cottons Department.			From Woollens Department		
		£	s	d	£	s	d	£	s	d
Jan 24	Requisition 524	10	2	6	10	2	6			
"	" 527	15	4	3				15	4	3
"	" 536	7	15	9	7	15	9			

The Summary Totals can then be journalized to debit and credit of departments affected Such materials, whether partly manufactured or not, must be priced at cost (plus value of work done) without any addition of profit

A difficulty arises in determining the values in respect of the correct addition for works expense this addition cannot be obtained by reference to the total amount of the transfers made, but must be based upon some factor more nearly related to the amount of work done to the material, and hence the cost of wages expended upon it is generally the fairest basis The departmental factory expenses will bear an ascertainable ratio in each department to the direct wages, and this ratio should be added in making up the cost of the goods transferred to other departments

General Expenses and Selling Cost are not chargeable except as an addition to Finished Goods when sold and dispatched

Stocks and Stores Records.

Stocks must be classified departmentally and individual stock records in a Stores Ledger shown on the following page will be found useful

Supplies of material from stores to departments must be recorded by means of Issues Notes and totalled in a Raw Material Summary which will give the total raw material week by week to charge to each department

Factory Expenses.

Expenses and indirect wages chargeable to one department or another must be allocated accordingly The distribution of general or indirect expenses including general wages charges, presents some difficulty The division is sometimes made on the basis of direct wages paid in each department, but it is essential for accuracy that the general factory charges should be apportioned after ascertaining the actual facts by careful analysis on the following lines, and this subject will be found referred to in greater detail in a later chapter

STORES LEDGER

INWARDS

Dr Article————

Date	Invoice	Supplier	Quality	Quantity	Price	£	s	d

OUTWARDS

Cr

Date	S Dept	C Dept	W Dept	Week's Consumption	Price	Value	Balance on Hand	
							Quantity	Value
						£ s d		£ s d

A Departmental Oncost Rate should thus be arrived at and may be based upon

(*a*) Direct Wages

(*b*) No of employees' working hours

or (*c*) No of units produced

This will furnish a useful basis of comparison from time to time and serve as a guide in checking allowance for works expense in estimating the cost of individual orders

The final presentation of results may be in the form of a Manufacturing Account or a Cost Summary, and the Cost Records can be usefully prepared in a Cost or

Departmental Ledger which will accumulate the results until the stocktaking figures make a reconciliation with the financial books at the close of the period

APPORTIONMENT OF EXPENSES[1]

	Use	Basis of Division
Coal	Power	Power required to drive machinery in different sections
Rent Rates and Cost of Heating		Areas occupied by section
Electricity or Gas	Power	As for Coal
„ „	Lighting	Number of lights in each section
Repairs		According to actual expenditure
General Factory Wages and General Services		Unless circumstances require otherwise according to totals of direct wages in each section
Sundry Stores		According to actual use
Depreciation		According to inventory value of machinery and plant

EXAMPLE OF EXPENSE APPORTIONMENT

ITEM	Total for week Adjusted as to outstanding or prepaid amounts	Silks	Cotton	Woollens	General Services
	£	£	£	£	£
Rent and Rates	30	15	5	5	5
Electric Power	120	50	20	40	10
Coal—heating	25	10	5	5	5
Tools	15	10		5	–
Repairs	50	30	5	5	10
Wages—					
Engineers' Staff	40	11	8	16	5
Storekeepers	30	10	10	10	–
Sundry Stores	20	10	5	5	–
Insurance	10	5	2	3	–
Superintendence	35	15	5	15	–
	£375	166	65	109	35
General Services		10	9	16	
		176	74	125	

Value of work in progress and finished goods unsold must be obtained week by week as closely as possible

In many businesses where the amount of Work-in-Process and Finished Stock is small or stationary, the credit to Manufacturing Account may be taken as actual sales, but where the stock of finished goods fluctuates, the credit of Manufacturing Account should be made up from a weekly Production Record instead of from the Day Book totals

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[1] See also pages 81–86

NORTHERN MANUFACTURING COMPANY

DEPARTMENTAL ACCOUNT FOR WEEK ENDING 22ND NOVEMBER, 19

Dr

			Silk				Cotton				Woollens		
		%	£	s	d	%	£	s	d	%	£	s	d
Nov 22	To Materials used		250	–	–		1,400	–	–		550	–	–
	„ Departmental Transfers— Add		50	–	–		–	–	–		100	–	–
	Less						150	–	–				
		60	300	–	–	90·5	1,250	–	–	79	650	–	–
	„ Wages	5	25	–	–	3 8	54	–	–	5	37	–	–
	„ Expenses	35	176	–	–	5 7	74	–	–	16	125	–	–
			501	–	–		1 378	–	–		812	–	–
	„ Work in Progress— Less Increase										140	–	–
	Add Decrease		109	–	–		75	–	–				
	„ Manufacturing Cost for Week	100	610	–	–	100	1 453	–	–	100	672	–	–

Cr

		Silk			Cotton			Woollens		
		£	s	d	£	s	d	£	s	d
Nov 22	By Finished Goods Account— Works Cost of Goods produced	610	–	–	1 453	–	–	672	–	–

The percentages shown are the percentages of Manufacturing Cost of Material, Wages, and Expenses, adjusted in respect of the Material Wages and Expenses included in Work in Progress.

Detailed Cost Sheet per standard article may now be prepared in each Department

FINISHED GOODS ACCOUNT

Dr		Silks	Cottons	Woollens	19		Silks	Cottons	Woollens Cr
19..									
Nov 15	To Stock of Finished Goods on Hand	500	420	1 543	Nov 22	By Stocks on Hand	470	600	1 340
22	" Cost of Manufacture per Manufacturing A/c	610	1 453	672		" Trading Account	640	1 273	875
		£1 110	£1 873	£2 215			£1 110	£1 873	£2 215

TRADING ACCOUNT

For Week Ending 22nd November 19

Dr		Silks	Cottons	Woollens	19		Silks	Cottons	Woollens Cr
19..									
Nov 22	To Manufacturing Cost of Goods Sold	640	1 273	875	Nov 22	By Sales	750	1 500	1 120
	" Gross Profit carried to Profit and Loss A/c	110	227	245					
		750	£1 500	£1 120			£750	£1 500	£1 120

PROFIT AND LOSS ACCOUNT

Dr		Silks	Cottons	Woollens	19		Silks	Cotton	Woollens Cr
19									
Nov 22	To General Expenses—				Nov 22	By Gross Profit for Week	110	227	245
" "	" Selling Expenses (specifically allocated in detail)	40	20	15					
" "	" Distribution Cost (based on dissection of carriage a/c	10	50	20					
" "	" Other Expenses (allocated on basis of cost of goods sold)	32	64	42					
" "	" Net Profit	28	93	168					
		£110	£227	£245			£110	£227	£245

This Production Record will give in detail the output of each department, the Total Works Cost or Cost of Production of which is represented by the net charges to the Manufacturing Account This total will be transferred to Finished Goods Account, and that account, after stock on hand is deducted, will show the cost of goods sold

The average cost per unit in each department may be obtained weekly or monthly and will be a guide to cost of manufacture This average will also be useful for checking the cost of any individual article or batch which can be computed in detail

Administration Expenses

These include—

SELLING EXPENSE—
- Commissions
- Travelling
- Advertising
- Discounts

DISTRIBUTION—
- Carriage
- Branch Offices

OFFICE EXPENSES—
- Salaries
- Stationery and General Expenses
- Audit Fees

MANAGEMENT—
- Salaries
- Commissions
- Directors' Fees

DEPRECIATION—
- (Not charged to Factory)

INTEREST ON LOANS

Expenses of general management embracing all the activities of a business may include several of the above headings Such items may be apportioned if desired and to some extent covered by Works Oncost

The allocation of management expenses between works and office must be arranged to suit circumstances There can be no universal rules

Allocation of administration expenses to lines of products or departments may be at a percentage on Works Cost (or upon the amount of sales) in each department with the exception that if any particular expense is incurred on behalf of any department (e g warehousing or interest charges upon special stores, advertising), the allocation should be varied accordingly This subject is considered in more detail in Chapter X

CHAPTER V

PROCESS COSTS

PROCESS COSTING is used to ascertain the cost of each stage of manufacture where material is passed through various operations to obtain a final product or result, with by-products in many cases at different stages.

Process Costing is used in Chemical Works, Refineries, Food Producing Factories, Dyeworks, Bleaching and Finishing Works, and the Textile Industries generally.

In these accounts the object is to arrive at the results at different stages of manufacture for comparison and pricing purposes. An account is required for each stage, which is debited both in quantity and in values with material in hand and fresh material. It is credited with by-products.

Similarly wages are analysed into corresponding stages and expenses (both Process Expenses and Indirect Works Expenses) apportioned on the same plan. The cost of the process is then shown by a compilation of these three sources of information, taking into account the quantity of the product obtained, which in the intermediate stages passes forward to the next process.

Indirect expenses will either be definitely process expenses, such as Heating, Repairs, Power, associated with one or more processes or operations and chargeable specifically thereto; or belong to General Works Oncost, e.g. management salaries, when division between processes may be determined on a wages or quantity basis.

By-products are credited to the process in which they are produced and it will be found that, if the value of by-products is less than the cost of original material, as is often the case, the cost of the resulting product is thereby greatly increased. Thus the cost of the process does not only consist in the running expenses but in the loss in weight when the final product is recovered

EXAMPLE OF PROCESS COST ACCOUNT FOR WORKS EMPLOYING CHEMICAL PROCESS

THE SWAN OIL REFINERY, LTD

REFINING ACCOUNT FOR WEEK ENDING 7TH JANUARY

Dr CRUSHING ACCOUNT Cr

	Tons	£	s	d		Tons	£	s	d
To Kernels	1,000	30,000	–	–	By Crude Oil to Refining A/c	500	28,675	–	
„ Wages		400	–	–	„ Cake to Cake Sales A/c	400	2,000	–	–
„ Power & Steam		150	–	–	„ Sundry Sales A/c (Bags, etc)		100	–	–
„ Repairs & Stores		50	–	–	„ Loss	100		–	–
„ Rent, Rates, & Expenses		175	–	–					
	1,000	£30,775	–	–		1,000	£30,775	–	–

Dr REFINING ACCOUNT "A" Cr

	Tons	£	s	d		Tons	£	s	d
To Crushing A/c	500	28,675	–	–	By Finishing A/c	450	28,520	–	–
„ Sundry Materials		250	–	–	„ Sundry Sales A/c Residual Oils and Fats	40	800		
„ Wages		120	–	–	„ Loss in Process	10	—	–	–
„ Power and Steam		135	–	–					
„ Rent, Rates, & Expenses		140	–	–					
	500	£29,320	–	–		500	£29,320	–	–

Dr REFINING ACCOUNT "B" (FINISHING) Cr

	Tons	£	s	d		Tons	£	s	d
To Refining A/c "A"	450	28,520	–	–	By Sales Account	447	31,900	–	–
„ Wages		125	–	–	„ Sundry Sales	2½	45	–	–
„ Barrels		3,000	–	–	„ Loss in Process	½	—	–	–
„ Power & Steam		200	–	–					
„ Rent, Rates, & Expenses		100	–	–					
	450	£31,945	–	–		450	£31,945	–	–

	Total Cost	Process Cost
	£ s d	£ s d
Cost of Raw Material	30 – – per ton	
„ Crushing Process		27 7 – per ton
„ Crude Oil	57 7 – „	
„ Refining Process		6 – 6 „
„ Refined Oil	63 7 6 „	
„ Finishing Process		7 19 10 „
„ Finished Oil	71 7 4 „	

A modification of this plan is necessary where a stock account is required for partly manufactured material at each intermediate stage, and in this manner the method shown may be adopted for obtaining the average cost of manufacture of articles which are not entirely identical, the average cost is useful for comparison from one period to another and serves to check the detailed estimates of individual costs where allowances will be required for greater or less expense of manufacturing a particular type according as the size or complexity of the type in question exceeds or falls below the average

An example of a Process Cost Account is given below for ascertaining and computing cost of manufacture in the case of a business making a Standard Article by repetition work in a series of well defined stages as in the manufacture

WEEK ENDING ____________

No 1 PROCESS—STAMPINGS

	No of Completed Parts	Value		Cost per Unit	No of Completed Parts	Value
		£		d		£
To Material from Stores		306	By Stock A/c—			
" Wages		120	Cost each	4.25	30,000	531
" Expenses per Charges Allocation (= 87.5% on Wages)		105				
		£531				£531

No 1 STOCK ACCOUNT

		£		d		£
To Stock of Stampings	1,150	25	By Process No 2 A/c		28,000	500
" Process A/c	30,000	531	" Stock c/fd @ 4.25d		3,150	56
	31,150	£556			31,150	£556

No 2 PROCESS ACCOUNT

ASSEMBLING AND TESTING

		£		d		£
To Stock A/c	28,000	500	By Stock A/c		25,000	994
" Material from Stores		200	" Sales of Scrap		500	5
" Wages		250	" Work in Process		2,500	81
" Expenses (= 52% on Wages)		130	" Cost of Process	5.3		
	28,000	£1,080	Cost each	9.55	28,000	£1,080

No 2 STOCK ACCOUNT

		£		d		£
To Stock of Assembled Fittings	50,000	2,000	By Process No 3 A/c		40,000	1,598
, Process A/c	25,000	994	,, Stock c/fd		35,000	1,396
	75,000	£2 994			75,000	£2,994

No 3 PROCESS ACCOUNT

FINISHING

		£		d		
To Stock A/c	40,000	1,598	By Finished Stock A/c		40,000	1,723
,, Packing		20	,, Cost of this Process	8		
,, Wages		75				
,, Expenses (= 40% on Wages)		30				
	40,000	£1,723	Cost each	10 35	40,000	£1,723

SUMMARY OF PROCESS ACCOUNTS

	No 1 Process	No 2 Process	No 3 Process	TOTAL
To Work in Process (if any)	—	—	—	—
,, Material	£306	£200	—	£506
,, Stock Accounts	—	cr £31	£604	£573
,, Waste	—	cr £5	—	cr £5
,, Wages	£120	£250	£75	£445
,, Expense	£105	£130	£50	£285
	£531	£544	£729	1,804
Less Work in Process car forwd	—	£81	—	£81
Gross Cost	£531	£463	£729	£1,723
No Completed	30,000	25 000	40 000	40,000
Cost each	4 25d	5 3d	8d	10 35d

METHOD OF VALUATION OF WORK IN PROCESS

WORK-IN-PROCESS NO 2 PROCESS ACCOUNT

= Material (2,500 Parts in process) $\frac{\pounds 700 \times 2,500}{27,500} = \pounds 63$

= Wages and Expenses (2,500 Parts in process taken as 1,250 parts completed) $\frac{\pounds 380 \times 1,250}{26,250} = \pounds 18$

$\underline{\underline{\pounds 81}}$

of brass incandescent gas burners by stamping, assembling and testing, and finishing departments

In compiling the Process Accounts shown each of the items will be made up by grouping the separate expense charges concerned, to facilitate accuracy and uniformity these expenses dissections should be carefully defined and standardized by means of Expense numbers or cost numbers for the main headings, and with sub-numbers for detail divisions, and under these numbers the wages and materials are most conveniently dissected

This method will facilitate the handling of the expense items, and also form a very suitable basis for instituting the use of the Sorting and Tabulating machines The totals of wages and subdivisions to Cost Nos, and totals of weekly Stores Issues with dissection under Stores Accounts Nos, and (after re-sorting) under Cost Nos can be promptly obtained and posted with a minimum of clerical work and delay

Gas Works Accounts.

The following outline shows a form of accounts where there are a number of valuable products obtained from the treatment of waste material The difficulty that specially arises in these accounts is that a value has to be placed upon material for which there is no market price, and a further difficulty in accounting for the quantities used occurs where solids are converted into liquids, or gases or liquids re-converted into solids The use of standard formulae based on the normal product of each process makes this possible

GAS, COKE, AND RESIDUAL PRODUCTS.

Pro formâ Account, illustrating stages of manufacture and expenses charged at various stages—

TRADING ACCOUNT FOR ________ _ _ _ _

	£	s	d		£	s	d
To Carbonization A/c				By Sales of Gas			
,, Purification A/c				,, Sundry Income			
,, General Expenses— Classified under distinguishing heads				,, Profit on Sales of— Dehydrated Tar Benzol Sulphate of Ammonia, etc.			

Manufacture of Gas

CARBONIZATION ACCOUNT

	Tons	£	s	d		Tons	£	s	d
To Coal used					By Coke & Ashes sold				
Wages—Retort House					,, Tar and Liquor A/c				
Repairs, Renewals, and Maintenance					,, Trading A/c—Cost of Gas made				

PURIFICATION ACCOUNT

	£	s	d		£	s	d
To Lime used				By Sales of Spent Oxide			
,, Oxide used				,, Trading A/c			
,, Wages							

BY PRODUCTS

TAR AND LIQUOR ACCOUNT

	Tons	£	s	d		Tons	£	s	d
To Carbonization A/c Value of Tar and Liquor made					By Crude Tar sold				
					,, Liquor sold				
					,, Tar Dehydration A/c				
					,, Motor Benzol A/c				
					,, Sulphate of Ammonia A/c				

UTILIZATION OF BY PRODUCTS

DEHYDRATED TAR ACCOUNT

	Galls	£	s	d		Galls	£	s	d
To Crude Tar used					By Sales of Dehydrated Tar				
,, Cost of Steam Fuel, Wages, and Maintenance									
,, Profit and Loss A/c									

MOTOR BENZOL ACCOUNT

	Galls	£	s	d		Galls	£	s	d
To Crude Material					By Sales of Motor Benzol				
,, Wages									
,, Stores									
,, Maintenance									
,, Profit and Loss A/c									

SULPHATE OF AMMONIA ACCOUNT

	Tons	£	s	d		Tons	£	s	d
To Crude Material					By Sales of Sulphate of Ammonia				
„ Sulphuric Acid									
„ Wages									
„ Stores									
„ Maintenance									
„ Profit and Loss A/c									

Pottery Costs

In the case of the pottery trade the costs consist of the ascertainment of the cost of output from a series of departments which may be regarded as processes in the course of manufacture The first series consists of preparation of the clay and the moulding, second, the baking in the kiln, next, the printing process, where the pattern is put on, a second baking process and possibly a second decorating or enamelling process and a third baking In the preparation departments the cost of clay must be first arrived at, then the different groups of products can be charged directly with the wages upon them This will ensue also in the printing and decorating departments In the baking processes the cost of heating the kiln will be ascertained and charged against the actual pottery which has been baked at a time The pottery is packed in "saggers" for the purpose of baking, and the correct charging and heating of the kiln determines whether the pottery will be correctly baked, as if there are defects in the heating, etc, it is not uncommon for the whole of the batch to be spoilt The expense occasioned therefore by defective work is a considerable source of loss, and the charges resulting under this head is one of the important features which should be revealed by costs

The costs will naturally take the form of independent calculated costs, but the financial accounts should be so arranged that the expense of each process can be separately shown, and the quantity of articles turned out can then be used to compare averages with the calculated costs

CHAPTER VI

TEXTILE ACCOUNTS—PROCESS COST METHOD

PROCESS Cost methods are adopted in the textile industries, the cost per lb of yarn or per yard or per piece of cloth being ascertained

Spinning Mills.

The cost divides itself into two parts—

(*a*) Cost of cotton (or other material),

(*b*) Cost of wages and expenses

The average cost of cotton will be found from the periodical Trading Accounts, which should be set out to show net consumption per lb of yarn produced

The cost of cotton enters into Manufacturing Cost apart from initial cost price on account of—

(1) Waste in processes—diminished by value of waste sold, and

(2) Loss by weight in processes through drying—diminished by subsequent absorption of moisture by the yarn

An advance in price of cotton therefore means an enhanced increase in cost of production of yarn

The fineness of yarn is measured in counts, the counts being the number of hanks (of 840 yards) contained in 1 lb of yarn, so that the cost of cotton per lb of yarn shown in the Trading Account will be the average cost, or the cost for the average counts produced by the mill Finer yarns will entail more waste as well as different mixings, so that the cost for each count requires separate investigation based on calculation and test

The cost of wages and expenses is seen in total in the Trading Account and the cost per lb yarn for average counts should be shown there

There is a difficulty in applying Process Cost methods from the fact that the material is continually in process, but the production at each stage is obtained for payment of wages—piece rates being universal

Wages and production are thus obtained in processes, and works expenses can be apportioned similarly by careful analysis

The expense cost varies with different counts of yarn produced, according to—

(1) Processes required to produce particular counts ,

(2) Production of machinery on different counts ,

(3) Effect on mill production as a whole, which may be increased or reduced with variations from the standard for which the plant is best adapted

Textile Processes

In framing the Financial Accounts a clear division should be made between raw material, material for various expenses accounts, productive wages and indirect wages, and other expenses , and these expenses should be further divided to separate works expenses from office and selling expenses At monthly periods a balance of the financial accounts should be made so as to ascertain the expenses of the month for comparison purposes The first view that is obtained, therefore, month by month, of the accounts of the business will be in the form of a Trading Account Where the stocks are not actually taken the values of these must be calculated from the Stores Records and estimated amounts of material in process

The second step that should be taken is to separate the main processes that are carried on so as to obtain an expense allocation for each stage The whole of the expenses should be dissected so far as possible directly against one or other of these sections, and such expenses as cannot be separately charged must be allocated on a fair basis There will be obtained a series of accounts for the different stages of manufacture, and the number of lbs of yarn spun, the number of pieces of cloth woven, and the number of pieces finished can be used as a basis for calculating the cost in each process per unit Up to this point the system that is carried on is entirely in accord with the financial accounts, and the records will be made up month by month, so as to contain a continuous series of records for comparison

COTTON SPINNING MILL

SPINNING ACCOUNT FOR HALF YEAR ENDING 30TH JUNE

Dr *Cr*

	lbs	£	s	d	per lb		lbs	£	s	d
To Consumption of Cotton—						Sales of Yarn				
Purchases						*Add* Stock 30th June				
Stock 1st Jan										
Less Stock 30th June						*Less* Stock 1st Jan				
Less Waste Produced—						Loss in Weight				
Sales										
Stock, 30th June										
Stock 1st Jan										
„ Wages and Expenses at Mill—										
Productive Wages										
Other Wages										
Rent, Rates and Insurance										
Power										
Heating and Lighting										
Stores										
Repairs										
Depreciation										
Other Expenses										
Office and General Salaries and General Expenses										
Balance Net Profit										

The average costs are thus shown in the Trading Account, and a similar statement of average Production Cost may be prepared week by week from Wages, Production and Expense Records Detailed costs for particular yarns are then ascertained by calculation and test based upon these statements

SPINNING MILL.

COST STATEMENT FOR WEEK ENDING_______

	Wages Paid	Expense Apportionment	Production lbs	Cost per lb
PRODUCTIVE WAGES—				
Preparation				
Carding				
Draw Frames				
Intermediate				
Roving				
Overlooking				
And so on				
NON PRODUCTIVE WAGES—				
Warehouse and Engineers				
Management and Office Salaries				

Total Wages__________ Production in Hanks______________

Expenses _______ Average Counts__________________

Net *Weight* Yarn produced__________

Total Cost per lb Yarn____________

MANUFACTURING ACCOUNT

FOR THE HALF-YEAR ENDING_______

	£	s	d	Percentage to Production		£	s
To Consumption of Yarn					By Production of Cloth		
Stock 1st Jan					*Add* Stock 30th June		
Purchases							
					Less Stock 1st Jan		
Less Stock 30th June							
To Weavers Wages							
" Other Productive Wages							
" Mill Expense—					SUMMARY OF EXPENSE—		
Staff Wages							
Rent and Rates							
Power							
Stores and other Mill Expenses							
" Office Expenses							
" Gross Profit							

SUMMARY OF EXPENSE—

	Total £	s	d	%
Wages				
Expense				

Weaving Mills.

A similar analysis of the Trading Account, together with a Weekly Wage and Expense Report, showing cost per yard or piece of cloth, can be prepared for the manufacturing department The wages are paid at piece rates and a percentage on weaving wage is added to cover Production Expense

WEAVING MILL

COST STATEMENT FOR WEEK ENDING__________

OPERATIONS	Total Wages Paid	Expense Apportionment	Production lb of Yarn or Pieces of Cloth	Cost per lb Yarn or per Piece of Cloth
Productive Wages—				
Winding				
Warping				
Sizing				
Twisting				
Weaving				
Overlooking				
And other operations				
Non Productive Wages—				
Warehouse and Engineers				
Management				
Office and Salesmen				

Weavers' Wages	£________	Preparation Cost	________d	per lb Yarn
Other Wages	£________	Weaving Cost	________d	per Piece
Other Expenses	£________	Indirect Cost	________d	per Piece
		Average of Total Cost		per Piece

Percentage of Expense to Weavers' Wages_____

To carry the detail of costs further than this, each of the departments already specified must be further subdivided so as to ascertain, as regards the running expenses, the approximate cost of running each machine or group of machines in the factory The works expenses must be allocated in detail on the methods explained in the chapter on Factory Expenses, so as to place upon each machine its fair share of the burden The office expenses will not be computed in this manner, as they are only chargeable on finished goods, and are not added to the value of these until they are sold The cost of running each machine having been ascertained, the number of hours that it is expected to be working must be estimated, and the total expenses divided by the total hours gives the estimated amount per hour that the machine will cost to run

PROCESS COST—DYEWORKS

Date

Particulars of Cloth

Pieces

Process.	Colours	Other Material	Wages	Power and Steam	Oncost	Total	Cost per Piece.			
							Colours	Wages	Power	Oncost
Total										
Summary	**Other Works Charges**									

The above Cost Sheet records the expense of dyeing individual lots through different processes The detail of material and wages of workmen are recorded on the reverse side

PROCESS COST—DYEWORKS

Summary of Cost

Month Ending ——————————

Total Pieces ——————————

Process	Hours Worked	Pieces dealt with	Pieces per hour	Manufacturing Cost			Oncost	Total Manufacturing Cost per Piece	Oncost per Piece	Total Works Expense	Total per Piece
				Colours	Wages	Power and Steam					

Summary of Oncost

Rent and Rates Staff Repairs Depreciation Other			
Total			
Cost per Piece			

Manufacturing Cost Oncost Other Expenses— Carriage Discounts		

The method of obtaining detail costs will then be for the material which will be required to produce a given quantity of the cloth in question (allowing for waste and loss of weight) to be priced out according to the known cost of material at the market price of the day

The direct wages will be known, as these are payable at piece-work rates The working expenses of the departments at the rate obtained in the most recent monthly accounts must be added, or alternatively, the rates of the different machines for the time that will be required to be devoted to the work must be totalled in the case of special work which is different from the average product To the total thus obtained must be added the rate of expense for office charges, carriage to customers, discounts and commissions to salesmen

Dyeworks

In the accounts of dyeworks and similar businesses, where the original value of the material treated does not enter into the accounts, the process cost is confined to recording the cost of the dyes and other materials, wages and running expenses A separate Cost Sheet is used for each lot of work done, which shows the individual expense for each process, and a monthly summary giving the totals of the individual Cost Sheets must be set off against the expenses shown in the financial books

For each department, in all textile as in other businesses, an expense rate per direct labour hour, or machine hour rates for each machine should be obtained and checked from time to time The expense rates will be reliable for detailed estimating and costing, and will provide a standard for comparisons

CHAPTER VII

JOB COSTING—TERMINAL COSTS

TERMINAL Costs are employed to show the cost of carrying out contracts and undertakings which are by their nature entirely separate and are terminated by the completion of the work

The accounts of a builder and contractor present the best illustration in simple form of the methods adopted in Job Costing Under this system the object is to arrive at the profit or loss on each contract The greater part of the work is estimated for, so that the price is fixed in detail in advance , other work is done by day work, and it is then no less important to ascertain the exact cost

TIME SHEET

Week ending

Name of Employee No Trade

Job Name and No	Time Worked						Total	Rate	
	Sat	Mon	Tues	Wed	Thur	Fri			£ s d
	Deductions								

WAGES BOOK

JOINERS Week__________________

No	NAME	Hours	Over time	Total	Rate	Amount	Deductions	Net

WAGES ABSTRACT

Week ending ________________

Joiners

Job No ____			Job No ____			Job No ____			Job No ____			Job No ____		
No	Hrs	Amount	No	Hrs	Amount	No	Hrs	Amount	No	Hrs	Amount	No	Hrs	Amount

Final Summary

Joiners

Job No ________

____

____

____

Expenses

Staff	£	s	d	Transport	£	s	d	Stores	£	s	d

STORES LEDGER

Article

No

Minimum Stock

Maximum Stock

Dr *Cr*

Date	Supplier	Quantity	Price				Date	No of Requisition	Quantity				Balance			
				£	*s*	*d*				£	*s*	*d*	Quantity	£	*s*	*d*

The method to be adopted will bring the Contract Ledger, in which the accounts of the different jobs are contained, into the double-entry book-keeping System, and thus ensure that the results obtained will be actual financial results The use of an independent Cost System, which is necessary where the number of individual cost accounts to be kept is very much greater, can be dispensed with in businesses of this type In the Contract Ledger an account will be opened for each job undertaken, and there will be a series of jobbing accounts for different types of jobbing work, so that the results of each group will be separately ascertained The Sales Ledger will not be interfered with, but, on the completion of each job, the amount of the contract will be credited to the Contract Account and debited to the Customers Sales Ledger Account

Wages

The wages are dealt with in the first place on daily or weekly time sheets, which are utilized in making up the total wages due in the Wages Book for the purpose of paying wages , and the gross wages are then analysed in a Wages Abstract for the purpose of charging up to the contracts or to Expenses Accounts for indirect labour (See pp 43 and 44)

A separate abstract will be used for plumbers and another for bricklayers in a similar manner The grand total will include staff wages not chargeable to any particular contract, and will be agreed with Wages Book Totals, and the total of each column in the abstract will then be posted to its appropriate Contract Account in the Contract Ledger and the staff wages and time spent on work chargeable to Expense Accounts (e g repairs) will be posted to the Nominal Ledger

Material.

Materials for contracts include special purchases and supplies from stores

The dissection in the Purchase Analysis Book will separate these two groups and will classify stores purchases as joiners, bricklayers or plumbers material and under these headings the Stores Accounts will be arranged

Special purchases will be posted direct from Purchase Analysis Book to Contract Account, the total amount of purchases for stores will be posted to debit of Stores Accounts in the Nominal Ledger under above classification

Stores Accounts should be kept in a Stores Ledger which contains records of all building material A separate account is required for each article, and this is debited

ISSUE NOTE FOR STORES

Date
Stores Ledger Fo
Contract Ledger Fo
Required for Job No
Name

	@	£	s	d

Authorized by
Received by

with quantity and value of (1) Balance in Stock, (2) all purchases subsequently, irrespective of the source of supply, it is credited with stores issued to Contracts or Jobbing Accounts, or used in repairs, etc, work and chargeable to Expense Accounts

The stores are issued to contracts only against Issue Notes prepared in the office, which are entered in a Stores Issued Book on presentation at the stores

The materials used must be priced at cost

The posting of the Contract Ledger should be made from the Stores Issued Book, or a Stores Summary, or a journal entry comprising the totals of the summary, and the total of the amounts debited to the Contract Accounts should be credited to the Stores Account in the Nominal Ledger, this account will show at any time the book value of the

STORES ISSUED BOOK

Date	No of Contract	Name	Requisition No	Details	Folio	Quantity	Amount			Joiners			Bricklayers			Plumbers		
							£	*s*	*d*	*£*	*s*	*d*	*£*	*s*	*d*	*£*	*s*	*d*

stores in hand, which should agree with the total of the list of balances taken out from the Stores Ledger The Stores Ledger Accounts should naturally be checked at short intervals with the actual stocks held Any shortages of materials, unless these can be traced to jobbing work, must be charged to Stores Adjustment Account as an Expense item

The Contract Ledger Accounts must be credited with any stores returned, posted from a Stores Returned Book, or entered at the end of the week or month in the Stores Issued Book as a deduction

PLANT The value of plant sent to the site should be charged to the Job Account In connection with long contracts there will be considerable depreciation in the value of the plant, and it is important that the contract on which this occurs should be fully charged with such loss In the Nominal Ledger an account should be opened for Contract Plant, and a list of plant available should be kept, each item having its value shown, and the total agreeing with the book value shown by this account When any plant is charged to a job, the Contract Plant Account must be credited, and when on the completion of the work the plant is returned, the Job Account will be credited with the estimated value, and the Contract Plant Account will be debited In the event of such plant being sold the credit will go directly to the job concerned In this way each job will be made to bear the full cost of the use of plant

SUB-CONTRACTS are debited in the same way as direct purchases, being charged to jobs in the Contract Ledger direct from the Purchases Analysis book

Disbursements on account of particular contracts are dealt with by posting direct from Cash Book or Petty Cash Book to Contract Ledger

Expense

Total expenses, including foremen's salaries, office salaries and expenses, insurance, rent and rates, cartage, advertising, repairs and depreciation, will be grouped in an Expense Allocation Account and apportioned to contracts at stocktaking times

Alternatively a definite scheme for charging Overhead Expenses to the contracts can be prepared, and the appropriate charges made to each job when the work is finished and the Contract Account closed A method often adopted which is not, however, sufficiently accurate is to charge a percentage on the outlay on each job , seeing that some contracts will consist mainly of material and others will have a small proportion for material and a larger amount for wages, thus entailing more expense in supervision and probably also being in hand for a longer period, it follows that a flat rate on both material and labour will not give a fair charge to each job, tending to overcharge the jobs on which the material forms the larger portion of the outlay It will be found by a close analysis of expenses that the wages should bear a heavier rate than material The correct charges to place upon material are those which are entailed by the buying, warehousing and handling of the Stores The total annual expense for these services can be obtained by analysis of the Financial Accounts, and, by dividing this proportion over the material, a percentage can be fixed as a Warehousing Rate Other expenses, including general management, may be sufficiently accurately proportioned as a percentage paid on the wages of each job Where there is a joinery department fitted with woodworking machinery it may be desired to have special hourly rates for the use of the different machines For the purpose of fixing these rates the following expenses in connection with the machines should be omitted in fixing the general oncost rates, and should be allocated specifically to each machine, and then the total of the burden on each divided by the total estimated hours it will work, gives the machine hour rate The charges to be included are the depreciation and repairs for the machine , the cost of power to run it , the proportionate share of the

CONTRACT LEDGER

Dr Contract No 152______ Name________WILLIAMS T R __________(Joiner's Work) *Cr.*

Date	Details	Fo	Direct Purchases £	s	d	Fo	Stores £	s	d	Date	Wages £	s	d	Total £	s	d	Date	Details	Fo	£	s	d
19 Oct 5	To Subcontract	4	52	7	4	15	125	4	–	19 Oct 1	25	–	–				19 Oct 31	By Contract		350	–	–
	„ Sundries					24	18	10	–	8	24	–	–									
	„ do					35	5	4	–	15	26	7	–									
										22	10	4	–									
			52	7	4		148	18	–		85	11	–	85	11	–						
	„ Direct Purchases													52	7	4						
	„ Stores													148	18	–						
	„ Expenses at 20% on Wages										17	2	–									
	„ 10% on Material										20	2	6	37	4	6						
														324	–	10						
	To Profit carried to Profit and Loss Account													25	19	2						
														350	–	–				350	–	–

Columns may also be provided for "Plant supplied to contract" and "Plant returned" space occupied covering rent and rates, lighting, heating, cleaning of the workshop, and, if it is desired to cover the annual cost of the money locked up in the machines, the normal rate of interest on the capital value of each should be brought into account

Journal Entries.

Under this system the Contract Ledger becomes an integral part of the double-entry book-keeping system A monthly Journal entry in the following form will serve to focus the Contract Ledger entries for posting to the Nominal Ledger

Sundry Contracts	*Dr*
To Special Purchases Stores per Stores Issued Book Sub-Contracts Productive Wages Chargeable Expenses	
Sundry Contracts	*Dr*
To Expense Allocation Account for proportion of General Expenses charged to Jobs	
Expense Allocation Account	*Dr*
To Sundry Expenses — Office Salaries Rent and Rates for Expenses actually incurred during the month etc , etc , etc	

Value of completed work is similarly credited to contracts and debited to customers

Sundry Customers	*Dr*
To Sundry Completed Contracts	

In this way each Contract Account becomes a separate Trading Account, showing its own profit or loss, and balances are transferred to General Profit and Loss Account

Where the work is done under Architects' Certificates, the amount of each may be credited as the work proceeds

The Contracts and Jobbing Accounts should bear similar charges for expenses

Uncompleted work must be valued as Work-in-Progress This may be taken at cost of outlay, that is, material plus labour, and the current percentage may be added for expenses When the method is preferred of only charging expenses to the jobs as they are completed, the amount of establishment charges on Work-in-Progress must be reserved for by debiting a Suspense Account when making up the periodical accounts No profit must be taken credit for, nor must the full value be allowed to stand if there is any reason to suppose that the work cannot be completed for the contract price An exception arises in the case of long contracts extending over several years, where a fair profit must be estimated as the work proceeds

A safe profit in such cases may be estimated at two-thirds of the profit shown on the basis of the value certified for by the architect's certificate, where payment is received on this basis, the balance of one-third being reserved against unforeseen difficulties in completing the work

Where only a portion of the value of the work done is

CONTRACTS ACCOUNT
THREE MONTHS ENDING 31ST MARCH, 19

Dr						*Cr*			
		£	s	d			£	s	d
Mar 31	To Losses—				Mar 31	By Profits—			
	Joiners					Joiners			
	Contract No 143	35	–	–		Contract No 152	25	19	2
	Plumbers (if any)					„ „ 262	15	–	–
	Bricklayers					„ „ 135	24	–	–
	To Net Profit	274	–	–		Bricklayers			
						Contract No 126	36	–	–
						„ „ 134	15	–	–
						„ „ 155	23	–	–
						Plumbers			
						Contract No 128	25	–	–
						„ „ 130	15	–	10
						Profit on Jobbing Account—			
						Joiners	50	–	–
						Bricklayers	60	–	–
						Plumbers	20	–	–
		£309	–	–			£309	–	–

PURCHASES ACCOUNT (JOINERS)

Dr						*Cr*			
19		£	s	d	19		£	s	d
Jan 1	To Balance of Stores in Stock	960	–	–	Jan 31	By Stores Issued Contracts	370	–	–
					Feb 28	„ „ „	950	–	–
„ 31	„ Purchases	740	–	–	Mar 31	„ „ „	740	–	–
Feb 28	„ „	780	–	–	„	„ Jobbing Account	1,975	–	–
Mar 31	„ „	1,975	–	–	„	„ Stock on Hand	420	–	–
		£4,455	–	–			£4,455	–	–

JOBBING ACCOUNT (JOINERS)

Dr | Cr

		£	s	d			£	s	d
19 Mar 31	To Stores Supplied	1,975	–	–	19 Mar 31	By Sundry Customers per Day Book	3,025	–	–
,,	,, Wages	700	–	–					
,,	,, Expenses	300	–	–					
	,, Net Profit	50	–	–					
		£3,025	–	–			£3,025	–	–

EXPENSES ALLOCATION ACCOUNT

Dr | Cr

		£	s	d			£	s	d
19 Mar 31	To Staff Wages	500	–	–	19 Mar 31	By Contracts per Journal	730	–	–
	,, Rents and Rates	120	–	–		,, Jobbing Account—			
	,, Cartage	65	–	–		Joiners	300	–	–
	,, Office Expenses	250	–	–		Bricklayers	100	–	–
	,, Insurances	75	–	–		Plumbers	25	–	–
	,, Advertising	20	–	–					
	,, Interest	15	–	–					
	,, Repairs	30	–	–					
	,, Depreciation	80	–	–					
		£1,155	–	–			£1,155	–	

paid as the contract proceeds the profit on the unpaid portion should be further reserved

Machinery and Plant are recorded in classified accounts in the Private Ledger, and suitable depreciation is written off year by year

It is an advantage to divide the closing accounts into—

Joiners' Contracts ,
Bricklayers' Contracts ,
Plumbers' Contracts ,

and to show the profit (or loss) on Jobbing in each department For the purpose of this analysis, some contracts will require to be divided when the final result is obtained

The amounts due from customers are shown in the Sales Ledger to the debit of personal accounts In the case of Jobbing work, the entries come through the Sales Day Book (analysed to show the three departments separately) In the case of contracts the Contract Journal contains the entries debiting the customer and crediting the Contract Accounts

Payments on account of contracts will consequently be posted to the Sales Ledger Accounts

CHAPTER VIII

MULTIPLE COSTS—LABOUR

MULTIPLE Costs apply to businesses where the products differ widely in type, value and complexity, where similar operations may be used to give widely differing ultimate results, where specialization and the standardization of parts may be extensively adopted

The application of Cost Accounts to businesses of this type usually follows the Job Cost system, with variations in sections of the works to which special methods are applicable

The object aimed at is to ascertain the actual cost of execution of each order as it is completed, and to obtain this the detailed dissection of all outlays is unavoidable, this entails considerable clerical work

The cost divides itself again into Labour, Material and Expense

Labour

METHODS OF PAYMENT—

(1) Time Rates
(2) Piece Rates—with guaranteed wage "Straight" or "Differential"
(3) Bonus Methods—
    Premium Bonus, Efficiency Bonus
(4) High Wage Plan
(5) Profit Sharing
(6) Output Bonus—Priestman Plan

TIME RATES are essential where work cannot be standardized or classified into suitable classes or grades for piece rating, and where special care and skill are essential

PIECE RATES are satisfactory, provided the rates are correctly fixed at the outset Differential Piece Rate gives extra percentage after a certain quantity is exceeded

Bonus Methods of various types have been devised to stimulate production and encourage employees to earn more than average wages, and at the same time to obviate the tendency on the employer's side to cut rates by combining a benefit to the employer with the workman's bonus, this being achieved by the reducing cost per unit to the employer, along with an increasing bonus and rate per hour to the employee The workman's objection from his standpoint is that he gets only a portion of the increased results from his extra labour, and that the system may be used for ascertaining maximum production with a view to fixing piece rates, alternatively, however, he can and does get a higher rate per hour and a larger total wage

Premium Bonus (1) In the "Rowan" system, the bonus paid to a workman is fixed as a percentage on wage earned equal to the percentage of time saved

Under this plan the workman will never earn double pay, but will usually have more than half of the remaining benefit, the employer having in addition a saving in expenses per job through increased output

(2) Another plan is to fix in advance the proportion of time saved which shall be credited (or debited in the case of time exceeded) to the workman, e g "Halsey" and "Weir" systems giving 50 per cent or 33⅓ per cent of actual saving as bonus

Efficiency Systems The object of these is to fix the minimum time in which a job can be done by skilled men and pay heavily for the reaching of the standard

The "Taylor" system gives a bonus of 25 to 50 per cent on day wage if the standard is reached, and if that is exceeded, then payment at piece rate, plus (say) 40 per cent, is earned

Modifications of this plan (e g Emerson) give the worker a graduated rate of bonus commencing at 5 per cent if output is 65 per cent of efficiency standard, and advancing by steps to 40 per cent when the 100 per cent is reached

EXAMPLE OF PREMIUM BONUS

"ROWAN" SYSTEM

Bonus being at same rate on wage earned as time saved is to time allowed—

Time allowed 100 hours Wage 2s per hour	Time saved	Per Cent	Wage earned	Bonus	Total Wage	Rate per Hour	Employer saves on Job
(a) Work completed in 80 hours	20 hours	20%	£8	£1 12s	£9 12s	2s 4¾d	8s
(b) " " 60 "	40 "	40%	£6	£2 8s	£8 8s	2s 9½d	£1 12s
(c) " " 45 "	55 "	55%	£4 10s	£2 9s 6d	£6 19s 6d	3s 1¼d	£3 0s 6d

ALTERNATIVE METHOD

Bonus being a definite share of time saved, say 50 per cent—

Time allowed 100 hours Wage 2s per hour	Time saved	Wage earned	Bonus = ½ Time saved	Total Wage	Rate per Hour	Employer saves on Job
(a) Work completed in 80 hours	20 hours	£8	£1	£9	2s 3d	£1
(b) " " 60 "	40 "	£6	£2	£8	2s 8d	£2
(c) " " 45 "	55	£4 10s	£2 15s	£7 5s	3s 2⅔d	£2 15s

The "Gantt" system is known as a task bonus wage system The time allowance is fixed for each job on a very exact basis Wages are paid at time rates per hour worked and if the task is not done within the scheduled time no bonus is earned If the standard time is taken, the normal rate plus bonus of, say, 40 per cent is earned

If the task is done in less than standard time, the full time allowed is paid for plus 40 per cent on actual time on the job

HIGH WAGE PLAN This plan proceeds on a day wage basis, but at rates 40 per cent or 50 per cent above district rates, with the object of compelling employees to use every ounce of effort and of enabling employers to insist on the highest possible standard

PROFIT SHARING schemes have for their object—

(1) Stimulating of employees' interest in the business ,

(2) Ensuring mutual oversight to eliminate waste (both of time and material) ,

(3) Improvement of methods by utilizing employees' ideas ,

(4) Retaining services of employees by giving them a permanent standing as part proprietors

The drawbacks to such schemes usually lie in—

(*a*) The payments being too far apart ,

(*b*) Bonus being too small to exercise a sufficiently strong influence ,

(*c*) The idea that proprietors gain more from the extra efforts of the workpeople under the scheme than is given in bonus ,

(*d*) Inability of employees to obtain access to the accounts ,

(*e*) Results being influenced by trading conditions which are beyond employees' control ,

(*f*) Objections to bonus distributions in the form of shares

Under the Port Sunlight (Lever Bros , Ltd) plan, employees of one year's service are entitled to participate in the distribution of co-partnership certificates, for the issue of which a fund is made available each year, depending on the profits earned The distribution is made in three grades based on merit awards, and the bonus shares receive a rate of dividend at 5 per cent less than the amount of the dividend on the ordinary shares There are restrictions on transfer

Under the scheme initiated by J T and J Taylor, of Batley, the employees receive a bonus annually out of profits available after paying a 5 per cent dividend on the share capital, the division of the surplus between shareholders and employees being in proportion to the capital employed and wages earned There is provision in the scheme for additional bonus to employees who have been long with the firm, and the bonus may be invested in the company's shares

Numerous other similar profit sharing schemes are in operation, having in most cases special features to suit local circumstances

With modern accounting methods providing monthly Profit and Loss returns the objections to such plans can be reduced

THE PRIESTMAN PLAN is typical of the Output bonus The scheme is to classify all work completed, and total weekly the gross production by weight, or by measurement of volume in points The standard weekly output is agreed upon between employers and men's representatives, and is subject to increase or decrease if the number of employees or working hours is increased or reduced Bonus is then paid to *every employee* at the rate of increase of output over standard

Profit Sharing Schemes and Output Bonuses are in the form of *group* bonuses, the gross results are used to determine the rate payable to the individual This plan is not considered economically sound by many works managers on the ground that each man should have the benefit of his own skill and effort to induce him to do his best work, and that none should benefit unless he has earned the bonus with his own labour At the same time the different methods are suitable under varying circumstances, and in some cases it is group organization which produces maximum output rather than individual skill

A plan successfully adopted in connection with revisions of Piece-work Rates provides for the consideration of these by a joint committee of management and employees' representatives with the object of securing that any rate which is found by a workman to be inadequate shall be inquired into and be adjusted if shown to be too low Similarly appeals by the management for revision of too liberal rates are considered, with the proviso that no rate will be reduced without a corresponding increase being given to a low rate

With the idea of encouraging interest in a profit sharing scheme the monthly Balance Sheet and Trading Account described in Chapter XI may be used, and it seems likely that this method of accounting will remove one of the principal objections to profit sharing schemes in making a monthly ascertainment of bonus possible

Wage Records

ENGAGEMENT OF LABOUR For the engagement of employees a history card should be prepared setting out full details of the employee's record, trade, etc, and this card should be retained for the purposes of recording advances of pay, etc, so long as the employee remains with the firm Each employee should be given a number which will correspond with the department where he will work, so that his department can be readily seen from the pay roll number

TIME RECORDING It is essential for the record of time spent in the works to be correctly obtained, and for this purpose a time-keeper is usually provided with either a time board on which each man can hang a brass check, or a time recorder clock in which each man can place his time card for the time of commencing and leaving to be mechanically recorded, as in the Gledhill-Brook system There is a certain saving in clerical work in the use of mechanical time recorders, but the presence of a time-keeper when recording is in progress is essential to prevent wrong use of the clock by workmen registering the time of others who are late or absent The total time provided by time-keeper's book from time board, or that recorded by the time recorder on the time card will be used for making up wages for day-workers, and will be checked off for piece-workers with the time booked on individual piece-work notes (See Time Sheet and Wages Book, pages 43 and 44)

PIECE-WORK NOTES Where payment at piece rates is in operation it is preferable to have a system of piece-work notes, by which the time spent on each job is recorded upon a separate note, in order to ensure the correct booking of time on each job There are many other advantages obtained from the elasticity of method resulting when each item of the wages dissection is recorded on a separate job note, even when day rates are in force The Time Sheets or Job Notes should be certified by the foreman in charge

PAY ROLL The Pay Roll is made up from the gross time records, with in the case of the piece workers the summaries of the Piece-work Notes A coin summary should be made at the foot of each Pay Roll Sheet showing the amounts required in £1 notes, 10s notes, silver and copper, to pay out exactly the wages on that sheet This makes the counting out much simpler and helps in tracing errors For compiling the Pay Roll a convenient method is the use of the Burroughs Wages Adding Machine, with which an operator can tabulate the Pay Roll with great rapidity, giving at the same time an automatic check on the additions and deductions The calculating machine is used for reckoning piece-work prices, bonuses and bonus additions to wages , and the adding machine summarizes the job notes of each workman, to obtain his total pay

The method of summarizing wages illustrated on page

44 has been superseded in many offices by the introduction of adding machines for the purpose The job notes after the completion of the Pay Roll are sorted into order of Jobs and Expense Numbers and listed, so as to give the total for each job or expense item with a grand total which

PIECE-WORK NOTE

Workman's No	Works Order No
Name	
Rate	
Date commenced	Time
Part	Price
Operation	Checked

No Off	Passed	Rejected	Inspected by

Time			Works Expenses	Week ending			
Day	Hours	Over-time	Shop Rate Machine No Machine Rate	Value of P W Price Overtime Bonus	£	s	d
Total Time				Total Wage			

Foreman's signature

agrees with the total wages of the Pay Roll A considerable amount of clerical work is saved by this means Where there is a large number of employees and the works is consequently divided up into separate shops, each shop requires to be dealt with separately as a distinct unit by means of a Shop Pay Roll and a Shop Wages Abstract A final summary of such Shop Wages Abstracts is then required either by tabulating the dissections in columnar form, giving the Shop Wages vertically and the charges to Jobs horizontally, or by mechanical summarizing methods The saving of time and labour by the latter process is considerable

A useful comparison may be made week by week of the percentage of indirect to direct labour As indirect labour forms one of the main items of works expense, this percentage will give an advance indication of rise or fall in works expenses as a whole

Extreme care in the payment of wages, so as to guard against irregularities must be ensured by a sound system as well as by a reliable staff The system must aim at placing responsibility upon several officials, who will check one another's operations

The clerks engaged in making up the wages should not also pay out to the men At the time of payment foremen who can identify the men should be present The Pay Roll should be submitted to and signed by the manager

Advances to workmen (subs) should be charged through Petty Cash and deducted in subs column on Wages Sheets Advances on I O U 's to workmen working at a distance should be refunded, and actual wages charged through Wages Sheet of outside staff

Decimal System of Time Recording

For some purposes it is found adequate to record time on jobs in tenths of an hour For this purpose a time clock is used which gives a time record with six-minute intervals The workman obtains the same time record on the job cards of both the new and the old job when changing over, and the calculation of time taken and wage is much simplified The system is not suitable when more exact recording is required

(See Chapter XIII regarding wages routine)

CHAPTER IX

MULTIPLE COSTS—MATERIAL

Material.

THE lay out of a factory necessarily demands suitable planning of the stores departments in relation to the work

It is essential that there be—

(1) Rough Stores conveniently situated for the receipt of raw material,

(2) Components Stores for completed parts,

(3) Shipping Department for finished orders,

(4) Good general organization to save time in carrying work through, suitably placed departmental stores, tool stores, etc

(5) Efficient transportation

Purchase Routine.

It is important to obtain a strict control of purchases in order to ensure that there is complete harmony as to prospective supplies between Stores Department and Buying Office and Contract Department who handle the orders received To ensure this the Contract Department having prepared a complete specification on receipt of each order will circulate it, supplying one copy to the chief Storekeeper On this he will indicate material available in his stores, and material not available which must be purchased The specification is then returned to the Contract Office, who issue Purchase Requisitions to the Buying Department for items of which the supplies are running short, and advise Planning Department of manufactured Stock items required The Stores Office will also perceive at any time from the records in the Stores Ledgers when the stock of any item is falling below its fixed minimum, and a Purchase Requisition should be immediately sent to the Buying Office

The minimum stock limit for any article will be determined by the rate of consumption and time required to obtain supplies The ordering quantity will be a convenient size according to the terms of the market and rate of consumption , and the maximum will usually be the same as the minimum plus ordering quantity

In the case of components manufactured for stock the maximum of each will be fixed so as to prevent excessive quantities being put into stock, having regard to rate of manufacture of other components

Receipt of Stores.

On receipt of goods the Storekeeper will record details of the material, quantity, quality, etc It is preferable that quantities, etc , expected should not be advised to the Storekeeper in advance and the responsibility for checking invoices should rest with the Accounts Department and not with the Stores Department

The Storekeeper will advise the Buying Office and Planning Department of goods received daily The goods will be examined by the Inspection Staff and complaints reported A daily Goods Received Sheet (with duplicates) or a separate Receiving Note for each item (with duplicates) is preferable to the use of bound books, on account of the greater ease with which carbon copies of the entries can be made and circulated to departments concerned When books are used two sets will be required for use on alternate days

The Buying Office will check details against invoice indicating whether the items are classed as Special Purchases or Stores Material and will insert correct Bin No and price , and then return the sheet to Stores Office for entry of debits of Stores Material to Stores Ledger.

In the case of Purchases for particular contracts the Buying Department will insert the number of the job on the invoice An extra copy of the Goods Received Sheet may be used to replace the entry of separate invoices in the Purchase Analysis, the Goods Received Sheet for this purpose being provided with a Cash Column and bound as part of the Purchases records The total of the sheets will then be carried into the Purchase Analysis Book

Stores Ledgers

The detail work required to maintain a continual check upon the consumption of material may entail considerable clerical labour It is useful for the following reasons—

(1) To control waste ,

(2) To safeguard against pilfering ,

(3) To assist Buying Department by providing records of quantities used ,

(4) To assist Stores Department in maintaining the minimum stock prescribed ,

(5) To provide means of taking an inventory without closing down the works

The Stores Ledger may take the form shown on page 67, or a more elaborate ruling can be provided with detail for values, if desired

The Stores Ledger should be under a separate control from the actual stores, as the Ledgers are for the purpose of a check upon the Storekeeper

The best method to adopt with a view to saving duplication of records may be set out as follows—

The Stores Office should be adjacent to the main stores, having an independent head responsible for the accurate posting of the Ledger entries , the Stores Ledgers being also readily available for reference by the Storekeeper

The Stores Ledgers are most advantageously kept on the loose-leaf method and, if the entries are numerous individual items may be entered in quantities only, the prices being noted to each item on the requisitions and the calculations being extended with the use of the calculating

STORES LEDGER

Article—

Minimum Stock

Maximum Stock

No

Dr				Cr														
Date	Supply Invoice	@	Quantity	Date	Req No	Quantity	@	Balance	Date	Req No	Quantity	@	Balance	Date	Req No	Quantity	@	Balance

machine by the Stores Section of the Cost Office At the same time the extension of values in the Stores Ledgers is an advantage as a check upon

(1) The accuracy of the prices or calculations on the requisitions and

(2) Omissions or inaccuracies in the posting

The Stores Ledger can then be balanced with a controlling Stores Account in the financial books It is also possible in this event for the Stores Issues to be totalled (preferably by the adding machine) in the Stores Office before the Issue Notes are handed over to the Cost Department, then when the Cost Department have re-sorted and summarized the Issue Notes according to the jobs concerned, the total for posting to the jobs can be obtained and agreed with the Stores total to ensure accuracy in the routine In order to reduce the amount of clerical work which is entailed in the keeping of Stores Ledgers on this plan when there are many thousands of individual entries required, the use of Ledger posting machines is an advantage, enabling the work to be done more speedily

Where the Sorting and Tabulating Machines are in use the method adopted is to total the weekly issues on the Tabulator Sheet and post the total issues to each Stores Account As the entries will be already sorted into correct order the posting can be rapidly done

A Lot No or Bin No should be given to each article in stock The number then ensures that the correct item will be understood whenever it is referred to

The numbers should be arranged according to code so that the items indicated can be readily identified and an index will be maintained by the Stores Office and kept up to date

The arrangements of the stocks in the Stores and of the accounts in the Stores Ledgers will follow the order of the Bin Nos

An advantage from a complete Stores record of all purchases is found in having an index for future reference containing details of all materials, parts, fittings, etc , that have been handled

Bin Cards.

It is a frequent practice for the Storekeeper to have a card attached to each lot of stores, indicating the amount in stock When further supplies arrive, the quantity received is noted in the " Received " column and, as the issues are taken from the bin, the quantity taken out is entered in the " Issued " column, and the third column will thus show the balance in stock This is frequently a useful plan if the Stores Ledgers are not available for reference by the Storekeeper, or are not entered up daily so as to be always up to date In some cases the bin cards are dispensed with as not serving a really useful purpose when the Stores Ledgers are promptly written up day by day

BIN CARD

ARTICLE______________________

BIN No ______________________

Received_____		Issued____________________________								
Date	Quantity	Date	Qty	Bal	Date	Qty	Bal	Date	Qty	Bal

Index of prices, including record of quotations as well as orders placed, should be kept in the Purchase Department

Stores Issues

Issues of stores are made only against Issue Notes or Stores Requisitions

Requisitions are of various types and should be distinguished by use of various coloured forms, e g —

(1) PRODUCTION ORDERS These are supplies of Direct material for the manufacture of

(*a*) Customers' Orders ,
(*b*) Stock Orders for standard parts

(2) Tools or Pattern Orders These are supplies of Direct Material chargeable to Tools Orders or Patterns Orders for Tools or Patterns, either for special jobs or for general Tools or Patterns Renewals or Stock

(3) Replacement Material for Spoilt Work Direct Material for Productive Work but chargeable to " Errors " or " Defective Work " Account instead of being charged to the job on which it is used

(4) Plant Maintenance Supplies of Material for Plant Repairs and Renewals chargeable to Expense Accounts

(5) Consumable Stores Supplies of Indirect Material chargeable to Expense Accounts, e g Oils and Lubricants, Waste, Canteen and Ambulance supplies

The Planning Department, in conjunction with the Drawing Office, will issue, in respect of each Production Order, a full detailed Works Order with drawings, complete instructions, and Material specifications Requisitions for such material may accompany the order or will be

WORKS ORDER

Number of Order	Date issued to works	Date promised for delivery

Particulars

Drawing No	Quantity	Quality	Finished Weight	Office Advised	Examined by

Material required

written out by foremen's clerks, and material will be drawn from stores as required The Storekeeper will retain the requisition, obtaining on it the workman's signature for the material issued , and will also enter the date of issue against the items concerned on the Material specification, which should be presented to him at the same time

In departments where work is of a repetition character, foremen will prepare their own requisitions for supplies to keep their machines running

Sundry stores for general consumption, e g oil and lubricant, will be requisitioned by the foremen

Tools are issued against deposit of requisition or tally by the workman requiring them, who will be responsible for their safe return, when the requisition or tally will be surrendered in exchange

Pricing Stores Requisitions.

The Stores Ledger will record the purchase price of each item of goods received, the information being obtained from the Buying Department entries upon the Goods Received Sheets These prices should be the actual cost prices delivered at works, any trade discounts being deducted and freight, Customs duty, carriage and similar charges added The Stores Requisitions will ordinarily be priced at the cost price of the earliest purchase which remains unexhausted Where the stocks have been written down, the reduced price must be recorded on each Stores Ledger Account, and this will be the figure for pricing subsequent issues

In cases where frequent purchases are made of the same articles, e g bolts and nuts, it may be impossible to keep accurate record of the issues made from each purchase, and where the prices are varying the plan to be adopted is to average the cost price of the stock on hand at monthly intervals and use the price so fixed as the value for the ensuing month

To find average cost price, the quantities at each price must be totalled, and thus the average cost of the whole quantity will be obtained

Transfers of Material from One Job to Another.

The accuracy of Cost Accounts is very frequently upset because of the transfer of material from one job to another, and difficulties arise where the practice is frequent As it is not advisable to consider clerical difficulties when the question is really one of hastening forward the completion of an urgent order, cases will always arise where material is transferred from one job to another to oblige a customer who is pressing strongly for delivery

In order to keep the costs correctly the details of the material or parts transferred and Jobs concerned should be recorded on a Material Transfer Note, which is handed in at the end of the day through the Stores Department to the Cost Office, and the item will then be transferred from one job to the other in the Cost Books

MATERIAL RETURNED TO STORES The Storekeeper will receive with all surplus material returned to Stores a "Stores Credit Note," which will be similar to a Stores Requisition but of a different colour These Stores Credit Notes will be passed through the Stores Ledger and to the Cost Office for credit to the job concerned and will be deducted from the total of Stores Issues in making up the periodical summary

Stocktaking.

Where a satisfactory system of Stores Accounts is kept, the annual stocktaking can be dispensed with The Stores Accounts should then be under the supervision of the Accounts Department, and the actual stock should be checked continuously by an independent stocktaker, who will report daily to the Accounts Department the particular materials he has counted or weighed and quantity found Any discrepancies will be inquired into

The adjustments in the case of deficits or surplus stocks will involve—

(1) Correction of Stores Ledger balance

(2) Debit (or credit) to Stores Adjustment Account in financial books

(3) Credit (or debit) to Stores Account in financial books

(4) Loss (or surplus) appearing in Monthly Expense Summary

Such discrepancies may be caused by

(1) Waste in measuring out ,

(2) Deterioration of stock ,

(3) Wrong pricing of issue notes ,

(4) Omission or inaccuracy in recording quantities

Where the periodical checking of Stock is not carried out, a reconciliation of the Materials Account in the financial books, with the inventory of the stores at Stock-taking time must be made, and differences due to any of the above causes may arise

In other cases the precautions which are necessary at stocktaking are to see that all material is counted or weighed by two independent staffs, one counting or weighing and the second checking the count and not merely copying the figures on to the stock sheet , precautions being also taken that no stock is missed and none included twice The stock should be valued at cost or market price, whichever is the lower, and, in the event of material having fallen in price since it was purchased, the Stores Ledger records should be written down and the amount of the loss charged to the Stock Depreciation Account

In the case of stocks which are held on account of appreciation in their value through storage, e g timber, an addition to cost is sometimes made for stocktaking purposes equivalent to the interest charges on outlay represented

Return of Material Used.

In some businesses a weekly summary of Material Issued serves as a useful guide to the Purchasing Department

In other cases a monthly inventory of Stores is prepared and a forecast obtained of the following month's output programme and material requirements These details then show what material *must* be hastened for delivery within the period Minimum reserve stocks must of course be provided, and the buying policy must be based upon the anticipated requirements of a more extended period

Stock Appropriation

To some extent it is found desirable in practice to keep Stock Appropriation Ledgers showing to the debit material or parts on order with outside firms or in the course of manufacture in own works, and to the credit the requirements for orders actually in hand for customers or for stock The balance on each account then shows the quantities on order in excess of prospective requirements, and is of vital importance to the Planning or Production Department This method is useful only for cases where a minimum stock cannot be fixed and relied upon to meet manufacturing needs from time to time For instance, a firm manufacturing machinery of numerous designs will require to ensure supplies of different sizes and varieties of many different metals, fittings and other equipment to meet not a fixed minimum of each but a supply of the actual quantities called for by the orders coming through It is the work of the Appropriation Ledgers to ensure that this supply will be available when called for, and the Stock Ledgers in the stores office will still show merely the actual stocks on hand Where the method of Stock Appropriation is resorted to it is preferable to have independent Appropriation Ledgers for the purpose, rather than to endeavour to combine this work with the Stores Ledgers, which indicate the actual stock of stores The Appropriation Ledgers will then be debited with available stock, which at stocktaking time consists of all material actually in stores and material on order , material called for by orders already in hand will be credited Orders placed for further material are then debited to the account, and the material required for each order received, as shown by the specification which is issued to the stores for Buying Department purposes, should be credited, the Appropriation Ledger will then show material on order in excess of what is called for by the orders in hand

Component Stores.

The General Stores which takes charge of all raw materials may be divided up into sections to suit the convenience of the different departments in the factory, but each should be under the control of the chief storekeeper, and the records should be kept in the stores office In addition to these stores there will probably be a Tool Stores and Components or Finished Stores

Finished Stores, whether consisting of complete machines or components ready for assembly, should be under the care of the Progress Department who will keep record of the manufacture and disposal of finished stocks

The Progress Department will prepare stock orders for batches of standard parts, so that these can be manufactured in bulk according to the most economical manufacturing quantity of each

The Progress Department will be supplied with copies of orders received and will appropriate against such orders the requisite standard parts as they become available

A minimum quantity of unappropriated parts of each type will be fixed and the stock orders for renewal will be issued as the available stock above the minumum is appropriated

By thus controlling the manufacture of stock parts strictly in accordance with immediate requirements, the prompt execution of orders for finished machines (practically from stock) can be assured and a safeguard is established against the over-production of some parts, which is a risk attending mass production systems

The supplies for Components Stores and Finished Stores will arise mainly from completed work on Stock Orders When finished these articles will be delivered to the appropriate stores, and a credit note for finished work will be issued and attached to the Works Order In a Cost Department the cost of the job will be obtained and charged to Stores Issues will then be made as required and charged out at the Works Cost price thus obtained

Stock Turnover

The rate of stock turnover is indicated by a comparison of the balance of Stores Account with the monthly withdrawals of stores, indicating how many times in a year the stock is being renewed

CHAPTER X

MULTIPLE COSTS—EXPENSES

Expenses.

THE charging of expenses fairly and equitably over work produced is the most difficult part of a Cost Accountant's duties It is impossible to determine actual expense in carrying out a given order for a customer, and the detailed application of sound principles in the distribution of total expenses is the only method that can be adopted

When the output of a factory consists of articles of a uniform design, the amount of indirect expense attributable to each can be ascertained by dividing the total amount of expenses for a definite period, say one month, by the number of articles produced , and if it is desired to obtain a comparison of the expenses with some other basic unit, as will be necessary if the *completed* article were only turned out at certain periods of the year—other seasons being devoted to the manufacture of parts—then the amount of wages in comparison with the expenses will be, in such a case, a reliable guide For example, a small engineering works manufacturing a standardized cream separator can calculate the cost of each machine by dividing the total outlay over a period by the number of machines turned out , or the ratio between the indirect expenses and the wages should be constant, provided efficient conditions are maintained

When a business having run on these lines adds a number of other products to its output, turning out in addition to the cream separator a dozen or more other agricultural implements, the method ceases to be effective as a true indication of the share of the expense to be attributed to each article because of variations in the work required to be performed Further, there is no ready indication in the accounts of the source of each expense by which increases can be investigated and cut off if not remunerative It is for these reasons that cost accounts come into operation

It must not be supposed, of course, that a low expense rate has any connection with efficient manufacture, because the expense rate is determined by the equipment provided, and therefore with expensive equipment there will be a high expense rate, but, having ascertained the expense rate that should result in a particular factory from efficient management, the aim should be to avoid exceeding such a rate

Expenses which are associated with particular jobs, e g travelling expenses to and from site, royalties, must be charged directly to the job concerned

Standing charges may be distinguished from incidental or fluctuating expenses on the ground that the latter continue in more constant ratio to output, whereas the former are not affected by output and will bear a lower proportion as output increases it is thus from one point of view profitable to accept orders which clear incidental expenses and show a margin towards standing charges only

Classification of Expenses

Charges which are grouped under the heading of expense, also referred to as Works or Establishment Charges, Overhead Expenses, Oncost, or Burden are divided into

(1) WORKS EXPENSES in which are included all items that are necessarily involved in the production of the finished article ready for sale This heading will consequently include such items as

Indirect wages including
- (*a*) Foremen and their assistants,
- (*b*) Shop clerks,
- (*c*) Timekeepers,
- (*d*) Storekeepers and stores labourers,
- (*e*) Power House wages,
- (*f*) Transportation wages,
- (*g*) Maintenance services,
- (*h*) Waiting time,
- (*i*) Labourers cleaning machine tools and shops,
- (*j*) Watchmen

Rent and rates of factory, or if the premises are owned, interest on the amount of the outlay *may* replace rent

Power, whether from coal, gas or electricity
Heating and Lighting
Insurances—Fire, Compensation and National
Sundry consumable stores—oil, waste, etc
Repairs and renewals
Depreciation
Salaries of works managers and works clerical staff
Experimental and research expenditure
Works stationery
Welfare, ambulance, etc
Inspection This is an example of a charge which can often be more advantageously made a direct charge by specific bookings to individual jobs Where this is not practicable it will be a works expense Another charge of this type is the cost of tool-setting, which may be a direct charge if the work is specially done for each job, but if the nature of the work permits several similar jobs to be put through each time a machine is set the cost must be made a general one and charged in the Oncost Rate

Cost of Overtime The extra payment made to employees for working overtime often does not fall upon the work which has necessitated the late hours, and for this reason and for comparison purposes between similar jobs, the charging of overtime on one and not on another occasions undesirable disparity To avoid this the cost of overtime may be regarded as an overhead expense chargeable to the department where the work is done, or if due to programme being in arrear, to department responsible for delay, if due to customers pressing for delivery, to the Cost Account of the job, if due to general pressure of work in excess of capacity, to general works expenses

Waiting Time Time of workmen while they are not actually at work should be booked as a separate expense charge This may arise through jobs not being ready, or material not being available, or cranes being employed, etc

If this expense is booked under a separate expense number against the department where it is incurred, the cost of waiting time can be traced and may be considerably reduced

(2) OFFICE OR GENERAL EXPENSES These are subdivided under Administration Expenses relating to general business management, and Selling and Distribution Expenses incurred in order to dispose of the finished goods They are a trading and not a manufacturing charge

Items of Administration Expense include—

General Management Salaries and Directors' Fees
Office Salaries
Stationery
Postages and other expenses
Rent, Rates and Insurance of Offices and depreciation of office furniture

Selling and Distribution Expenses include—

Salesmen's salaries and commissions
Advertising and printing of catalogues and price lists
Agencies and branch office expenses

Carriage Carriage and cartage of raw material is part of the cost price of the material, and not an overhead expense, but, to simplify the pricing of stores, the cost of local carriage and cartage is often classed with General Works Expenses Carriage outwards may be included with Selling Expenses or treated as a specific delivery charge on each product

Discounts and Bad Debts Frequently, these two items are not dealt with by means of oncost Discount is then an addition to the cost of each order ; and bad debts are treated as losses chargeable against trading profit

Discounts or commissions receivable are a source of income, usually treated as extraneous to manufacturing and trading operations, but for simplicity these are frequently deducted from administration expenses Trade discounts should be deducted from purchase invoices

The question of interest is dealt with later See page 102

The need for the division between works and office expenses arises in the first place because the two sets of expenses are related to entirely different factors in the handling of the goods, the works expenses being incurred on each article in proportion to the effort put out in its manufacture, and the general expense being incurred on each article in proportion to the difficulty of marketing it, and in the second place the manufacturing expenses are a proper charge to include in a valuation of work-in-progress, but the selling expenses can be charged only against sales of finished goods and the general management expense is usually similarly treated

Expenses in Financial Accounts

As already explained in the chapters dealing with materials and wages, the Cost Office should dissect the charges under those headings, so as to be able to obtain in the financial accounts as complete an analysis as possible of the expense incurred In order to facilitate this a series of standing orders or factory expense orders should be prepared, each standing order defining a particular class of expense and having a serial number The workmen, in booking time and obtaining stores, will then specify the standing order number covering the expense item under which the material or wages falls, and the analysis in the Cost Office is facilitated Thus, in respect of wages the time sheets or job cards of each man when chargeable to indirect expense will show—

(1) Shop to which he is attached and man's number
(2) Standing order number on which he is working
(3) The department for which the work is being done

For example, tool room mechanics repairing tools for No 15 department would book their time against number 15/18, when 18 represents the standing order number for tool repairs The figure 18 without a shop number would indicate that the repairs are general and not for a specific shop Similarly, repairs to power house plant done in 25 shop would be booked to 10/14, 10 being the Power

House Department and 14 the standing order number for repairs to plant Similarly with material, the storekeeper will insist before issue upon the identification in this manner of the use of all material demanded The expense standing order number then indicates the expense classification into which each item falls, and this is all that is required for accounts purposes The shop number will be wanted at a later stage, in order to identify the charges with the shops or departments to which they should be placed

A periodical analysis of wages earned and stores issued is compiled by the Cost Department and on this basis the Accounts Office will journalize the transfers from Wages and Stores Accounts respectively At similar periods an expense summary should be taken out from the financial accounts which serves to focus the indirect charges and should be used—

(1) For criticism of current expenses in comparison with a standard schedule laid down in advance

(2) For comparison month by month with previous summaries

(3) For the purpose of securing control over the expense charges in detail by the allocation of each charge over the works departments responsible for incurring it , a comparison being made from time to time of such departmental charges

A useful comparison may be made week by week from the wages dissection of the ratio of direct or productive wages to total wages, but as the indirect wages do not embrace, by any means, the whole of the running expense, this comparison does not entirely cover the field

In place of numerical standing order numbers a series of symbols is sometimes used, e g. B R for Building Repairs, P R for Plant Repairs, and so on

Periodical Comparisons.

In the preparation of periodical expense summaries on these lines, the question presents itself of the period to be adopted for the purpose Seeing that wages are necessarily dissected in weekly periods, whereas purchases, salaries and trading results are most conveniently dealt with in monthly periods, the practice is often used of having two four-week months and a five-week month to each quarter This has the advantage that none of the periods is sufficiently far away from the calendar month to disturb the monthly charges, but the main purpose of the expense comparison is destroyed because of the recurring five-week wages periods The logical method appears to be to

MONTHLY EXPENSE SUMMARY—WORKS EXPENSES

		Total			Purchases			Stores Issues			Wages			Journal		
		£	s	d	£	s	d	£	s	d	£	s	d	£	s	d
1	Foremen															
	Assistant do															
	Ratefixers															
	Setters up															
2	Storekeepers															
3	Shop Clerks															
	Timekeepers															
	Progress Clerks															
4	Crane Drivers															
5	Shop Labourers															
	Yard Labourers															
	Transport do															
6	Sundry Labour															
	Waiting and Learning															
7	Inspection															
8	Indirect Material															
9	Steam and Electric Power															
10	Heating															
11	Gas and Electric Light															
12	Water															
	Repairs to															
13	Buildings															
14	Plant															
15	Transport and Rolling Stock															
16	Machinery															
17	Patterns															
18	Loose Tools and Utensils															
19	Jigs and Dies															
20	Rent and Rates															
21	Insurance															
	Fire															
	Health and Unemployment															
	Compensation															
22	Stationery															
23	Salaries of Works and Technical Staff															
24	Salaries of Works Clerical Staff															
25	Experimental and Research															
26	Canteen and Welfare															
27	Depreciation															
28	Stores Adjustment															

MONTHLY EXPENSE SUMMARY—GENERAL EXPENSES

	Total			Purchases			Salaries			Petty Cash			Journal		
	£	s	d	£	s	d	£	s	d	£	s	d	£	s	d
Office Rent and Rates															
Heating and Lighting															
Insurances															
Office Salaries															
Stationery															
Postages															
Sundry Expenses															
Depreciation															
Travellers' Salaries															
„ Commissions															
Agency Expenses															
Advertising															
Catalogues, etc															
Discounts															
Carriage															
Bad Debts															
Bank Interest															
Directors' Fees															

adopt a four-week month all the year round with 13 periods to the year and this arrangement gives excellent results

The above example of a monthly expense summary indicates a useful method of tabulating charges The source of each expense in the books is indicated and serves as a check upon the figures brought into account and a useful indication of the type of the expense, e g in connection with repairs, the amount of purchases, stores material used, and wages incurred should be shown against each item The fifth column will comprise special journal entries, transfers from Suspense accounts and other exceptional charges

Departmental Analysis of Works Expenses.

Assuming the total expenses of the month to be tabulated in this manner, the next step is to allocate the works expenses over the departments, because, according to the information which can be obtained of the expense of running the different departments and the actual work which necessitates the expense, the system of oncost to be used for charging up expense to the work done will have to be determined

The nature of the work carried on will determine the division into departments The natural division of a works into separate workshops may not be sufficient for this purpose because more than one kind of work may be carried on in each shop, and there should be a separate department for each distinct class of work or process The following would be some of the typical departments in an engineering works—

Pattern Shop,
Foundry,
Heavy Machine Shops—which may be divided into
  Planing, Boring, Turning, etc
Light Machine Shops—similarly divided,
Tool Shop,
Erecting Shop,
Test Department,
Paint Shop

The above would be operating departments charging up labour to the work undertaken, and the total amount of expense must ultimately be placed upon these shops and, by means of oncost rates, upon the work which they do

In addition to these operating departments the non-productive or general service departments may include—

Power House,
Transport,
Stores,
Building Service,
Hydraulic Power Service,
Compressed Air Service,
Welfare,
Management, and others

Allocation of Works Expenses

In order to obtain a basis for dividing the charges in the financial accounts it will be necessary to obtain statistical data according to the incidence of each expense A schedule setting out a natural method of division and a number of typical expenses is shown below, and in the preparation of such a schedule care must be taken that the original data are correct The basis in the case of heating, lighting, and building service will be a more or less permanent division and a percentage of the monthly total in accordance with the fixed scale will be charged to each department Where the basis of allocation is the

EXAMPLES OF SCALES FOR ALLOCATION OF WORKS EXPENSES NOT DIRECTLY BOOKED TO SPECIFIC DEPARTMENTS

Expense Service	Basis of Allocation	Departments									
		1	2	3	4	5	6	7	8	9	10
Steam or Electric Power	Consumption Return										
Heating	Volume of Premises										
Gas	Consumption										
Electric Light	No of lights										
Water	Consumption										
Hydraulic Power	"										
Compressed Air	"										
Building Service Including Rent, Rates, Fire Insurance, Repairs, etc	Area or Capacity of Buildings										
[1]Stores Service	Total Wages in Operating Departments										
[1]Transport Service											
Office											
Management											
Welfare											
Health and Unemployment Ins	Actual										
Compensation Ins	"										
Depreciation and Fire Insurance	Value of Plant										

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[1] *See* Note upon Warehousing Oncost Rate (p 102)

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ALLOCATION OF EXPENSES TO OPERATING SHOPS—GENERAL SERVICES

Account	Total per Summary	Power	Heating	Gas and Water	Hydraulic	Building	Stores	Office Management and Welfare	Transport	Totals to Shops
	£	£	£	£	£	£	£	£	£	£
Foremen	500									500
Storekeepers	150						150			
Shop Clerks	220									220
Progress Clerks	100							100		
Crane Drivers	145						15		40	90
Labourers	350					20	120	20	100	90
Sundry Labour	50				20					30
Inspection	250						50			200
Indirect Material	125						5	5		115
Power	320	320								
		−80			+ 30			+ 30	+ 20	
Heating	120		120							
			−30				+ 15	+ 15		
Gas	55			55						
				−20				+ 20		
Water	20			5	15					
Repairs	750	100	50		10	75	20	10	20	465
Rent and Rates	400					400				
		+ 20				−100	+ 30	+ 50		
Carriage	220								220	
Fire Insurance	110					110				
National Health & Unemployment Insce	150	3			1		10	20	15	101
Compensation	80	1					3	6	5	65
Works Salaries	400							400		
„ Clerical	120							120		
Stationery	100							80		20
Experimental	20							20		
Canteen and Welfare	100							100		
Depreciation	800	20	5		5		10	10	20	730
Stores Adjustment	20						20			
	£5 675	£384	£145	£40	£81	£505	£448	£1,006	£440	£2,626

It will be understood that considerable detail has been omitted actual consumption, the records (or estimates if no actual records are available) should be obtained at frequent intervals Where the allocation is based upon wages, the actual wages of the period in question must be used, and in connection with depreciation the machinery and plant schedules for each department should be frequently revised There will often be special circumstances modifying a strict adherence to general rules, which are, of necessity, only an approximation to the true position e g in the case of stores service, a department having a departmental store of its own and carrying the whole of that expense might fairly be relieved of part of its share of the general stores service Similarly, the cost of works management salaries may not be a fair charge on all departments on a wages basis, as when one department requires skilled technical advisers and another is of a different nature and can be run with slight supervision, an adjustment of the wages scale may fairly be called for

When the basic scales have been prepared the first step is to separate those departments which may be termed General Services as distinct from Operating Shops, and extract the allocation of expenses to be made to them

This will entail not only the merging of some of the expense items entirely in the General Services, but the adjustment of the charges to be made by one General Service to another, each department having still to be regarded as bearing a fair share of each expense in which it benefits, and various charges accrue to the General Services in addition to the direct payments shown in the financial accounts, e g Stores Department will be charged with not only the storekeepers' wages, but with a share of the rent and rates, etc (coming under the head of Building Service along with Building Repairs, Fire Insurance, watchmen, and other allied expenses), also with Light and Heat, Repairs, and any other charge incurred for it by another department

The Expense Charges will thus be grouped as directly

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ALLOCATION OF EXPENSES TO OPERATING SHOPS

Service	Total	Dept 1	Dept 2	Dept 3	Dept 4	Dept 5	Dept 6	Dept 7	Dept 8	Dept 9
	£	£	£	£	£	£	£	£	£	£
Foremen	500	25	80	25	80	25	80	25	80	80
Shop Clerks	220	10	35	10	35	10	35	10	35	40
Crane Drivers	90		30		30					30
Labourers	90	10	10	10	10	10	10	10	10	10
Sundry Labour	30	5	20		5					
Inspection	200			100			100			
Indirect Material	115	5	25	5	25	5	25	5	10	10
Repairs	465	20	140	10	50	90	120	20	10	5
National Health & Unemployment Insce	101	5	16	5	16	5	16	5	15	18
Compensation	65	3	12	3	12	3	12	3	9	8
Stationery	20						20			
Depreciation	730	30	200	20	70	130	180	10	15	75
Power	384	15	100	10	35	65	90	5	7	57
Heating	145	6	20	6	20	6	20	6	20	4
Gas and Water	40	5	5	5	5	3	2	3	2	10
Hydraulic	81		81							
Building	505	25	80	25	80	25	80	25	80	85
Stores	448	20	70	18	55	25	80	15	30	135
Management	1 006	50	170	40	130	60	200	30	70	256
Transport	440	20	70	18	55	25	80	15	30	127
Oncost on other Shops' Repairs			+ 30	- 70		+ 15	+ 25			
	£5,675	£254	£1,194	£240	£713	£502	£1,175	£187	£423	£987
Direct Wages .	£3,000	£150	£500	£120	£400	£160	£600	£100	£200	£770
" Wage Hours	33,900	2,000	6,000	1 000	3,500	1,500	7,000	900	2,000	10 000

chargeable to specific shops or chargeable to certain General Services which are to be allocated according to the scales already drawn up

The next step, after arriving at the amount of the General Services charges, is to distribute these as shown on the second schedule over the operating shops, along with the directly booked expenses as indicated by the shop numbers affixed to the standing order numbers on the time sheets and material requisitions which have come from the shops By this means each of the operating departments is burdened with a fair share of the whole of the factory running expense

Tool Department

In the Tool Department of an engineering works Direct Labour and Material are used upon the manufacture of tools entirely for certain jobs , to that extent the expenditure, along with appropriate oncost, is a specific charge to the jobs Other tools will be Department Expenses and so require to be included in the Tools Expenses charged to other shops The Tool Department will thus show the following position—

Dr		TOOL DEPT NO 3		*Cr*
To Direct Wages	£120	By Production Orders—		
,, Direct Material	500	Tools for Specific Jobs		£860
,, Wages—Other Shops Repairs	35	,, Shops Tools Repairs—		
,, Material—do	315	No 2 Shop—		
,, Expense Allocation	310	Wages	£15	
		Materials	125	
		Expense	30	
				170
		No 5 Shop		105
		No 6 Shop		145
	£1,280			£1,280

The Direct Wages and Materials represent outlay on Production Orders for specific jobs , the Expense Allocation is the amount of Tool Department running charges The tools made for specific orders must be costed at Direct Material, plus wages, plus oncost, and charged to the respective jobs The work done for the other shops will be costed on the same lines In the Schedule, page 89, this is illustrated in the adjustment on the last line of the allocation, where the Tool Department No 3 credited with £70 and other departments are respectively debited in respect of the oncost on the Repairs executed by the Tool Shop for the other three shops In this table the "Other Shops Repairs" are shown in the columns of the department for which the repairs were executed The oncost charged to departments 2, 5, and 6 is therefore an addition to the amount of repairs in these three departments, and the amount of £70 is a deduction from the various running expenses incurred in Department 3 This leaves a balance in Department 3 of running expenses to be charged upon the Production Orders, so that as the wages of these Production Orders have totalled £120, there is an oncost rate of 200 per cent applicable In arriving at this Oncost rate, the wages on Production Orders plus the wages of Other Shops Repairs Orders must be added together and divided into the total Expense Allocation

The treatment of the expenses in tabular form saves the necessity for writing up book-keeping accounts for each shop and serves exactly the same purpose

It will be found that the departmental plan may be applied in fixing an oncost rate for workmen engaged upon outside repair work or erection of plant A low rate of oncost will be applicable, for internal works expenses will not fall on to their operations at all but only such items as supervision, works office, works management

At the foot of the distribution schedule is shown the amount of direct wages in each department for the same period and the number of hours comprised in these wages

Departmental Oncost Allocation in the Financial Accounts

This allocation of works expenses to the departments may be carried into a special section of the Nominal Ledger by crediting Factory Expense Allocation Account and debiting Department Accounts for each shop in respect of the allocations made The model on page 104 is a useful form of ledger account to adopt for this purpose

The amount of oncost chargeable to Work-in-Progress Account will then be credited to such Department Accounts This will have the effect of showing the position of each departmental oncost rate in the financial accounts

An alternative plan, which has many advantages, is to maintain in the financial accounts the arrangement of expenses shown in the periodical expense summary, so that at the end of the year the total expense under each head is obtained The dissection, month by month, of these expenses over the departments is recorded as a statistical matter in the Cost Office by means of expense schedules similar to those reproduced, and at the end of the year the total amount of expense on each department is obtained The grand total of this will, of course, agree with the grand total of the expenses shown in the expense summaries, and by this means the same result is obtained as will be produced if the monthly allocation to departments were journalized but without quite so much complication

Charging Works Expenses to Jobs.

The problem that presents itself now is to determine the best method of ascertaining the proportion of works expenses chargeable to each job, so that the charges shall bear a close relation to the cost of the work performed in each case The following methods must be examined—

ONCOST METHODS—

Flat Rate as Percentage of Direct Wages
,, ,, per hour of Direct Wages
Separate Rates for Machine ⎫
,, ,, ,, Fitting ⎬ Labour
,, ,, ,, Hand ⎭
Warehousing Rate on Material
Departmental Rates per hour of Direct Wages
,, ,, as Percentage of Direct Wages.

EXAMPLES OF COST

Contrasting Methods of Charging Expenses

Total Week's Wage	£500	" A ' Shop	£120	" B " Shop	£250	" C ' Shop	£130
" " Hours	5,500	"	1,700	"	2,000	"	1,800
" , Expense	£1,200	"	£500	"	£500	"	£200
		Shop " A "		Shop " B "		Shop " C "	
Total Expense Equals 240% or 52 4d. Hr		416 6% or 70 6d hr		200% or 60d hr		153 9% or 26d hr	

	Total		Total Expense		Shop " A "				Shop ' B "				Shop 'C "				Total Expense at Departmental Rates	
	Wage	Hours	240 %	Hour Rate	Wage	Hours	416 6 %	H/R 70 6d	Wage	Hours	200 %	H/R 60d	Wage	Hours	153 9 %	H/R 26d.	%	H/R.
Order 1	£50	470	£120	£102 12 4	£40	370	£167	£109	£10	100	£20	£25					£187	£134
Order 2	£30	350	£72	£76 8 4					£10	100	£20	£25	£20	250	£31	£28	£51	£53
Order 3	£70	830	£166	£181 4 4					£50	600	£100	£150	£20	230	£31	£26	£131	£176

Machine Rates per hour of Direct Wages Machine Rates as % of Direct Wages	Combining General Rate

Machine Rate per hour of Machine Time in conjunction with a General Works Rate on Direct Wages

RATES OF ONCOST—

It will be observed that the model, (p 89) gives an average rate of—

190% or 3s 4d per hour	on Direct Wages

and Department Rates ranging between—

315% and 128% or 6s 8d per hour and 2s per hour	on Departmental Direct Wages

(1) *Percentage on Wages* One very general method of charging factory expenses is by a percentage on the amount of direct wages charged to each job This has the advantage of simplicity, but in most cases it is entirely unsound because—

(*a*) No adjustment is made for the equipment used by different workpeople, as, for example, where in one department a mechanic is using an expensive tool to shape a heavy casting and in another department hand labour is employed on light work

In view of the fact that in an engineering works, for example, different types of machinery will incur different amounts of expense in the various departments in the course of manufacture, it becomes important to know upon which machines the greatest expense is being incurred Where a flat rate is used any two machines upon which a given number of hours or a given amount of wages has been expended, will be charged with the same amount of Oncost or Works Expenses, whether the work has been done mainly in an expensive department or in one in which there is very little machinery and equipment

(*b*) Even if the whole of the operations were of the same type, the expense would not necessarily vary according to the wages paid, because the wages of one employee and another naturally vary for the same amount of work, so that a flat rate of expense as a percentage of direct wages can be correct only if the work is entirely standard and the wages at uniform rates Where this is the case the undercharge of expense in the heavy shops is balanced by the overcharge in the light shops as the work goes through As it very rarely happens that the same proportion of time is spent in each department on every product, so the resulting oncost is bound to be incorrect in the majority of cases The amount of inaccuracy in the costs may indeed be sufficiently substantial to more than counterbalance the amount of profit obtainable on some of the articles manufactured, and, in effect, although a flat rate of oncost may be showing an apparently satisfactory profit on all goods, the correct adjustment of the oncost would show that without certain particular lines the trading result as a whole would be considerably improved

(2) *Direct Labour Hour Method* It is consequently preferable to obtain the number of hours of direct labour on each job by totalling the time recorded on the time sheets in making up the wages abstracts, and, by dividing the total direct labour hours into the factory expenses, a charge on an hourly basis is obtained and Works Expenses at this rate can be placed to each cost account for the number of hours worked by the men on it This is more correct than a percentage of wages, because the factory expense corresponds more closely with the number of hours worked than with the amount of wages paid, and the irregularity of oncost caused by unequal rates of pay is eliminated, but a flat rate on this principle still takes no account of the equipment used The result of the flat expense rate, whether as a percentage or a rate per hour, is to overcharge

the jobs which are done by hand labour or with light machinery and to undercharge those on which heavy machines are used

(3) *Rates on Classes of Labour* A simple plan to avoid this result to some extent is to fix (*a*) a general rate for hand labour based on works expenses without considering expenses attributable to machines, (*b*) a higher rate for fitting shops allowing for the cost of tools, etc , and (*c*) a heavier rate for machine shops Where there is no great diversity in the types of machines this plan is satisfactory, and it may be applied in the form of percentages on wages, or rates per hour , the percentages plan being an approximation from the rate per hour to endeavour to obtain the same result without the elaboration required to record the hours worked

In extensive works a more elaborate plan is necessary An engineering works may be equipped with heavy machine tools, requiring considerable space to operate, repairs, power, and other running expenses in proportion , as well as other shops where the work may be entirely hand labour engaged upon light metal articles , and with many grades of machine shops between these two extremes

An example may be quoted, giving illustration of total cost where different classes of labour are employed on the same work

	Rate per Hour	Time per Piece	Wage Cost	Expense at 200%	Total Cost	Expense 5s hr	Total Cost
	s *d*		*s* *d*	*s* *d*	*s* *d*	*s* *d*	*s* *d*
Skilled	2 –	2 hrs	4 –	8 –	12 –	10 –	14 –
Semi skilled	1 4	2¾ ,,	3 8	7 4	11 –	13 9	17 5
Learner	8	5 ,,	3 4	6 8	10 –	25 –	28 4

The items shown in the comparison (p 93) are representative orders, and under each method the total expense charged comes to approximately the same amount , but owing to the different systems of apportionment, serious differences arise

Order No 1 shows an expense charge of £120 on the

General Percentage basis, on the General Hour basis, £102 12s 4d, corrected on the Departmental basis to £134

Order No 2, on the General Expense basis, has an expense cost of £72–£76, corrected on the Departmental basis to £51–£53

Order No 3 has a reduced cost also on the Departmental plan—£176 on the hour method against £181

Departmental Rates

It is frequently found sufficiently accurate for practical purposes to group the operations of a factory into departments, each department comprising a group of similar machines, or a single machine, or a set of operations For each such department a separate oncost rate must be fixed, either as a rate per hour of operation of the different machines, or a percentage upon the wages incurred For the sake of simplicity in the Cost Accounts the percentage method is frequently adopted, but this has the disadvantage that the oncost charge will fluctuate with the rate of wages paid, whereas it should be affected only by the number of hours worked, e g in the case of two men operating similar machines, one earning a high rate of bonus as a piece worker, and the other not being so skilful, the amount of oncost charged in respect of the two machines should be the same for the hours worked, but in the case of the piece worker earning a heavy bonus if the percentage rate is used a heavier oncost charge will be obtained

A "Department" for this purpose will consist of a shop where a specific process or variety of work is carried on, or a group of similar machines—forming part of a machine shop containing several such "departments" The essential plan is that each separate kind of work must form a department to itself The works expenses are then allocated to the departments, and a rate is fixed for each department based on the direct or productive wages paid in it, either as a percentage or a rate per hour Within each department an average rate of working is obtained so that approximately normal results of working are constantly secured

The features of the departmental oncost system are—

(1) Department rates of oncost

(2) Allocation of Works Expense to the departments—either monthly or yearly

(3) Comparison of Department Expenses with oncost recovered and consequent revision of oncost rates

It is advisable that a monthly allocation should be made of the works charges so that the expense being incurred by each department can be ascertained and controlled A schedule or budget should be prepared in advance, and comparisons should be made against this standard as well as against the amount of oncost chargeable on the work done in the shop Alterations of oncost rates should be made only at longer intervals—sometimes yearly—to obtain permanence wherever possible and to avoid changes in estimating for contracts

Machine Rates.

A further development in the accurate recording of working cost is to endeavour to ascertain the expense of running each machine, in order to be able to charge the work done on the machines with the actual expense due to such work being performed The first step is to ascertain the correct departmental rates and these must be subdivided in turn Instead of treating each machine separately, which might result in an excessive number of almost similar rates, it is usually preferable to treat them in groups and fix a rate for each group The machine rate may be arranged to include the whole of the works expense upon the basis of the number of hours the machine will work, or it may be arranged in conjunction with a general works rate which provides for the general expense of the factory, and the machine rate will then cover only the expense directly associated with the machine The latter method has the advantage, perhaps, of obtaining the closest degree of approximation that can be expected to the actual expenses incurred on each job, but this plan, while apparently sound, has the following weak points—

(*a*) It is impracticable to allocate with accuracy the works expenses over all the machines separately, on account of the irregularity in running time

(*b*) Even if the above allocation is attempted it is impossible to estimate the time that each machine will run during any future period

(*c*) In consequence no correspondence between expense of running and oncost earned by each machine can be maintained

(*d*) From the point of view of application in practice the use of a multiplicity of rates leads to inaccuracy in costing

The particular items of shop expenses which are covered by—

(*a*) Productive hour rate applicable to all wages,

(*b*) Machine hour rate applicable only to machine time, may vary in different cases, but the general principle to be worked upon is to include in the machine rate all those expenses which are necessarily associated with the provision of the machines and to base upon the productive hour rate all those general charges which would remain if the machines were discarded

Unless these charges are very carefully handled, and the detail work in connection with the compilation of the oncost records is accurately carried out, the results are apt to be more inaccurate than is likely to arise with departmental systems This is a serious drawback in practice and on this account the method has been frequently found unsatisfactory

For the fixing of machine rates more detailed analysis of the works expenses is required, in fact, each department must be split up so as to obtain an allocation of its expenses over the machines, treating each machine in all respects as the departments were treated in dividing up the total works expenses In this way individual expense charges are obtained for each machine and, allowing for the average running hours, an hourly rate can be fixed

The items needed are—

(1) Building Service Expense for space occupied with cost of heating and lighting

(2) Power

(3) Repairs and sundry supplies including tools, oil, etc

(4) Charge for Capital Outlay consisting of depreciation and interest on outlay

In determining the first, regard must be had to the space occupied by the machine and its surroundings

The second and third will be ascertained from the records of power, etc , consumed and the requirements and running hours of machines in the shop

The fourth will be arrived at in detail in every case in accordance with amount to be written off the particular

EXAMPLE OF MACHINE RATE

COMPARISON OF COST OF PRODUCTION ON TWO MACHINES

	MACHINE "A"	Cost per annum	MACHINE "B"	Cost per annum
Rental Cost	Floor space occupied say 400 ft at 1s	£20	say 300 ft at 1s	£15
Power	50 weeks of 48 hours, less 15% idle time, estimate	£200	Estimate	£50
Repairs	Estimated to average	£50	Estimate	£10
Capital Outlay	Cost £1,000 5% Interest	£50	Cost, £500	£25
	18% Depreciation to reduce value to £100 in 5 years	£180	6% Depreciation to reduce value to £200 in 10 years	£30
Works Rate	1s per hour	£102	1s per hour	£102
	Cost per annum	£602	Cost per annum	£232
	Cost per running hour (2,040 hrs per annum) or	£ 295 70 7d	Cost per running hr or	£ 113 27 17d
	Wage cost per hour, say	37 d	Wage cost per hour	24 d
		107 7d		51 17d
Capacity, or Output in units of standard work		30 units	Output	10 units
Cost per unit		3 59d	Cost per unit	5 117d

machine, and may be varied from time to time, especially if additions are made

General Works Rate may be included in the machine rate, or it may be necessary to divide this charge between machine labour and hand labour when both are at work in the same shop

From this it will be seen that Machine " A " will produce more cheaply than Machine " B," assuming that it can be kept occupied so as to attain the benefit from its extra capacity

In a shop having already a shop rate, where it is desired to fix a rate specially for one machine or group of machines, a plan readily adopted is to eliminate the items (2), (3) and (4) above from the shop rate, and add the exact amounts applicable to the machines in each case

In some works it is preferred to use the machine rate for machine charges only, in addition to a general works rate applicable to all direct labour on a percentage basis, and the application of the example given (A) would then be a machine rate of 4s 6d per hour for the number of hours of the machine time, which would be separately recorded on the job notes of the men working it, together with an oncost rate on direct wages of say 50 per cent

In the event of a departmental plan being adopted the amount of oncost in each department will be obtained from the direct wages each week as soon as the wages analysis is complete, and this amount compared month by month with the allocation of expenses will indicate whether each department is meeting its share of the burden

The value of the Departmental Expense Allocation method still remains in a machine rate system, because the department oncost (whether wholly on wages or hours, or partly on wages and partly on machine time) in each department will show whether the rates are adequate or if any department is failing to earn the charges upon it

Warehousing Oncost

A difficult point arises in the correct allocation of charges incidental to the buying of material, handling and transportation of same to the operating departments All these charges may be dealt with under the heading of Stores and Transport Services, and the plan sometimes adopted is to allocate stores service charges to the jobs on the basis of material used It cannot be said, however, that the expense incurred on different materials will vary directly with their value or their weight, and on this account the plan is frequently preferred of merging the stores charges in the general works oncost Approximately, however, the correct stores service charges can be obtained as a percentage on the value or rate per cwt of materials, if the materials are grouped in a series of classes, and a separate warehousing rate fixed for each class It then becomes important to observe that the amount of warehousing rate charged to the jobs on this basis will suffice to cover the stores expenses referred to

Interest.

There are many divergent views among cost accountants as to the method of treating interest in obtaining correct costs of production It is argued that interest is profit and should be disregarded entirely in arriving at the costs, and in businesses where there is little expensive plant, and departmental rates or machine rates are not required, this may be the simplest course to take, and this practice is usual and has the advantage of bringing out the costs upon a basis clear of standing interest and dividend charges which from a costing point of view are closely allied At the same time a sound objection can be urged in cases where machine rating is used, because the comparative cost of operating two machines is not correctly obtained unless the cost of the capital locked up in each is taken into account In concerns where large sums are laid out in equipment, and especially where the results of operation of different plants in the factories are to be compared, it is obvious that the cost of providing the equipment should be taken into account in making the comparisons and fixing the differential rates From this point of view it must be borne in mind that the accountant is concerned

SCHEME FOR CALCULATION OF INTEREST FOR DEPARTMENTAL ALLOCATION

Buildings	Total	Amount attributable to each Department or Percentage of Total Area used by each Department				
		Shop A	Shop B	Shop C	Shop D	Office
Value of Outlay	£	£	£	£	£	£
Interest at Market Rate, per cent	£	£	£	£	£	£
Plant & Machinery		Value of equipment in each department				
Value of Outlay	£	£	£	£	£	£
Interest at Market Rate, per cent	£	£	£	£	£	£
Total Interest on Buildings and Plant for including in Works Expenses	£	£	£	£	£	£
Ditto—Office Expenses	£	£	£	£	£	£

DISTRIBUTION OF INTEREST IN RESPECT OF STOCKS ON HAND AND ON CONSIGNMENT AND OUTSTANDING BOOK DEBTS

Accounts	Total	Value in respect of each line of Products or other Classification of Goods Handled				
		1	2	3	4	5
Stocks on Hand	£	£	£	£	£	£
Stocks on Consignment	£	£	£	£	£	£
Book Debts	£	£	£	£	£	£
	£	£	£	£	£	£
Less proportionate deduction for Trade Creditors outstanding	£	£	£	£	£	£
	£	£	£	£	£	£
Interest at Market Rate for inclusion in Office Expenses, say, per cent	£	£	£	£	£	£

with interest on money laid out, charged at a fair market rate upon the amount of the permanent outlay in the shops and departments, and it is immaterial whether the business has to provide interest on debentures, mortgages, loans, or in any other form whatever

Where it is found desirable to take this circumstance into account, as particularly arises in the case of a company operating a number of factories, the charges may usefully be arranged under two heads—

(1) RENT—covering an equitable charge for the use of buildings which are owned

(2) INTEREST ON PLANT—covering a market rate of interest on outlay which will be allocated over departments and machines

FACTORY EXPENSE ALLOCATION ACCOUNT

	Jan	Feb	Mar	Apr	etc
To Foremen	500				
„ Storekeepers	150				
etc					
„ Inspection	250				
„ Indirect Material	125				
„ Power	320				
„ Heating	120				
„ Gas	55				
„ Water	20				
„ Repairs	750				
„ Rent and Rates	400				
etc , etc.					
	£5,675				
By Shop No 1 Exp Allocation	254				
„ „ „ 2 „	1,194				
„ „ „ 3 „	240				
„ „ „ 4 „	713				
„ „ 5 „	502				
etc., etc.					
	£5,675				

A Monthly Standard may be fixed for each expense item and each shop, and shown in a separate column of this schedule

The amounts to be charged under these heads should be included in the monthly expense summary and will form a credit to Interest Account against Standing Interest Charges

An alternative method is the proportionate reduction of all rates equal to the amount of the interest included in fixing them

In this connection it should, however, be noted that for the purpose of valuation of work-in-progress the interest included in the oncost rates cannot fairly be capitalized and must therefore be written back by making a reserve for the estimated amount

The same procedure will naturally be required where the works expenses in any period have amounted to less than the total of oncost charged to the Cost Accounts

PATTERNS, TOOLS, etc , are dealt with in Chapter XI, page 122

Works Expenses should be charged on (1) Sales Orders and Sales Repair Orders , (2) Stock Orders for parts, etc , for stores , (3) Plant extensions and Capital Expenditure (except when small in amount) , but not on Works Repair Orders, Tools, or similar jobs which are themselves expenses (Except as explained on page 121)

An example of a Statistical Department Expense Account would appear as follows—

No 9 SHOP EXPENSE ACCOUNT

		£			£
Jan 31	To Total Sundry Expenses, chargeable to Shop, including General Works Rate	987	Jan 31	By Machine Hours (say)— 2,200 @ 5/- £550 400 @ 7/- 140 300 @ 10/- 150	840
				,, Shop Rate on Hand Labour, say, 380 Hours @ 3/-	57
				,, Balance equal to 6d per hour chargeable on 3,280 Wage Hours or transferable to Oncost Adjustment Account	90
		£987			£987

The balance of this account arises either through—

(1) The shop expenses having exceeded the estimated amount or

(2) Idle time reducing the number of operating hours

In the first case it may be necessary to increase the rates, in the second case regard must be had to the probability of improvement

The oncost balances resulting when making up final accounts for an annual Balance Sheet should be transferred to the Manufacturing Account, as they reveal a profit or loss as the case may be If an oncost reserve is desired a *credit* balance may be carried forward for this purpose

Idle Time

The cost of idle time will thus be represented by the unrecovered oncost, e g a department having 200 idle hours with an oncost rate of 2s an hour will incur idle time expense of £20, small savings in respect of power, etc, will reduce this to some extent

During periods of depression, expenses of idle departments and unabsorbed expenses of departments through low output should be charged against trading, being distinguished from manufacturing costs

In addition to revealing the amount of the shop charges not absorbed by the machines, the totals of machine time also serve for the record of idle machine time, whether caused by slackness of trade or machines being out of repair

MACHINE RATE

articulars of Machine
ocation
ost
dditional Outlay

Estimated Life

Depreciation Rate

WEEKLY RUNNING EXPENSES

Date ascertained	Power	Repairs	Oil	Depreciation and Interest	Rental Charge	Total Machine Cost	Average Hours Worked	Rate per Hour	Wage Cost

The Idle Time record is necessary in judging the cost of one machine or method against another and may be usefully compiled as a percentage on the total running hours

The record below may be entered weekly, time worked should be entered in black, and time at rest in red, so that the total for any particular machine over a period can be readily ascertained, also the relation of idle time to time worked can be seen at once, and the amount of possible income represented by the idle time charged up at the correct rate for each machine is obtained

In certain cases an exceptional treatment of machine records may be required in order not to load particular work excessively A machine may be in use only a fraction of working hours but may be essential in order to carry out other important contracts, the cost of the machine is thus incurred for the benefit of the plant as a whole and the general rate must bear part of its cost In effect

MACHINE TIME

No of each Machine and Current rate	1 5/-	2 3/-	3 2/6	4 10/-	5
Week Ending					
Hours at Work					
Hours at Rest					
Week Ending					
Hours at Work					
Hours at Rest					

IDLE TIME REPORTS —The record of idle machine time should state the specific reason why the machines are not at work This information can then be used by the progress office with a view to obtaining a division of work so as to relieve congestion in another part of the factory a rate will be fixed for such a machine on the basis of what it would cost if run a fair proportion of its time, and the fact that the machine is not actually earning its charge at this rate will be made up by a change on the general works rate

Where a "standby" machine is required in order to ensure continuous production if the working machine should fail, the costs of both machines must be included in the machine rate of the working machine so that the whole expense will be absorbed in the number of hours working

An exception may arise to the charging of expenses to work performed, where trade runs in busy and slack seasons Here it would not be practicable to charge the whole of the current expense at the slack time An average rate must be fixed which will be sufficient if spread over the whole year, and in the busy season care must be taken that the expense for the whole year is then actually made good

Defective Charges.

The cost of making good defective work or the loss arising in consequence deserves special attention, and in some businesses forms a very important factor in the manufacturing results Defective charges are therefore to be subdivided under suitable headings

(1) Defects in material which may again be subdivided in suitable cases

(2) Defects of workmanship—subdivided if necessary

(3) Defects in design

Under these headings the expense charges arising through the ordinary channels of material, wages and oncost should be grouped, the charges under each works order number being made up separately so that a statistical record can be obtained of the defective charges on each job It is preferable, however, that the defective charges should not be placed to the Cost Accounts of the job direct, as otherwise a fair comparison of the cost of different jobs is prevented and the actual record of defective work is hidden in the general details

Maintenance and Guarantee Charges.

A similar method should be adopted in dealing with maintenance and guarantee charges, where the machines are supplied on guarantee for a specified period and have to be maintained in running order The charges under these headings should come against the manufacturing results and may be provided for by a reserved amount against the Cost Account of each order, such items being credited to a Suspense Account The direct charge to each job is preferable to a debit in Works Charges or Oncost Account

Another point arises when certain lines have to be quoted in competition with other works more favourably situated It may be justifiable in such cases to debit this work with lower rates than those generally in force and to regard part of the expense as falling on the works as a whole, or chargeable against the General Profit and Loss Account It is obvious that there is a limit to the extent to which this method could be adopted

Cost of Heating Furnaces

In the metal trades the cost of heating furnaces in certain departments forms a very high proportion of the departmental expenses Different weights and sizes of ingots, tools, etc , will require to be heated for different periods to reach the requisite temperature, and the weight may not be in proportion to the time required for heating Consequently the weight basis cannot be used, and the cost of heating the furnace per hour must be ascertained and charged to the ingots according to the number of hours in use In the case of standard work charges can be fixed for different weights

Bakery Oven Hours.

In the bakery and confectionery trades a similar principle for the purpose of charging different batches of articles for the use of ovens must also be adopted If the ovens vary in size the capacity of each must be expressed in terms of a standard oven The cost of operating, heating, and maintaining the oven per hour must be arrived at for each temperature required This is expressed as a cost per oven-hour The cost of using a particular oven at a particular temperature can be expressed at a rate per hour by multiplying the cost per oven hour by the factor relating to the capacity of the oven Costing will be based upon the recipes used, with allowances for evaporation of moisture and for waste owing to defective baking, breakage in packing, etc It will be necessary to keep adequate stores records and to check the output with the estimated output, so as to keep a check on waste The charges to various batches for use of ovens must be set off against the expenses incurred in maintaining and heating the ovens The other works expenses of an indirect nature will be dealt with as an overhead based on a charge by weight, and by departmental rates according to the amount of expense in connection with the different classes of goods

General or Office Expenses.

Where the products are similar to the extent of being disposed of in the same market, and by means of the same selling organization, a percentage on works cost may be used to cover all charges of administration and distribution and allocations may be made to Works Expenses in respect of Factory Management

In other cases, in the computation of Administrative Expenses some exceptions arise It is not equitable to apportion these by a similar addition to the Works Cost in every case For instance, one department in a works uses expensive material, e g platinum, another department is producing goods on which heavy advertising expense is undertaken, another concentrates upon a product selling in proportionately large quantities, with a minimum selling expense, at a cut figure

In these cases the output must be analysed and the expenses classified on a fair basis—much necessarily resting on intelligent judgment—and rates for Administrative Oncost must be fixed for each class of product separately

The aim in such cases is to look at each section and try to ascertain what its position as regards expense would be if it were a business by itself, in other words, what expense a competitor in each line would have to carry

Allocation of Office and Selling Expenses over Various Classes of Finished Goods

Administration Expenses—	
Office Salaries and General Office Expenses Rent, Rates, Postages, Stationery, etc	Proportionate to Turnover, and may be charged by an Oncost Rate on Works Cost, with adjustment in the case of goods sold in bulk lots
Management Salaries	Ditto
Directors Fees	,,
Selling and Distribution Expenses—	
Travellers' Salaries and Commissions	Proportionate to Sales effected individually of each class of goods
Carriage	Proportionate to actual charges on each class of goods
Discounts	Proportionate to terms of settlement in each class
Bad Debts	Actual analysis of Bad Debts over each class of goods
Advertising, Catalogues, etc	Actual outlay on each class of goods
Branch Expenses	Proportionate to Turnover or actual sales of goods in each class
Bank Interest	Values of Stocks held and Book Debts in each class

It may be necessary to use a flat rate on works cost for office expenses and a further selling oncost at differential rates for different products

In other businesses the actual commissions, discount, and carriage on each contract can be charged up to its cost account

Expenses and losses which are incidental to the holding of stocks should be distinguished from the expense of (1) buying, and (2) selling the goods Warehousing expense will be proportionately reduced with increased rapidity of turnover

In calculating costs of merchanted goods the principles applicable to general administration and selling expenses must be observed

CHAPTER XI

THE COST LEDGER

THE summarizing of results may be carried out in a number of ways, and the most appropriate form for the Cost Ledger depends entirely upon the amount of information which is desired in a particular business and the circumstances of the case

(1) The Cost Ledger may conveniently be ruled with separate columns for the main headings of expenditure as shown on page 114, and the loose-leaf form is usually found the most convenient on account of the ease with which similar items can be grouped together and completed jobs withdrawn

(2) The preparation of costs upon Cost Sheets which are

COST SHEET

Works Order No 0621

Customer W JONES { Date, 8th October, 19
Promised, 20th October, 19
Date completed, 15th October, 19

Particulars

10 × 2½ in Pedestal Bearings

	WAGES				Material		
	Shop 1	Shop 2	Shop 3				£ s
Oct 10	25 hrs £2	4 hrs 5/4	18 hrs 36/	Oct 10	Iron Castings	1372	2 10 -
17			10 hrs 17/		Brass Castings	1373	2 5 -
	25 hrs £2	4 hrs 5/4	28 hrs 53/-		W I Bar 1¼	1374	2 - -
					Steel Nuts	1375	10 -

	£ s d	
Total Material		7 5 -
Total Wages		4 18 4
Factory Expenses—		
(1) 25 hours @ 2/	2 10 -	
(2) 4 hours @ 2/6	10 -	
(3) 28 hours @ 4/6	6 6 -	
		9 6 -
Factory Cost		21 9 4
Office Oncost, 20%		4 5 10
		25 15 2
Profit		4 4 10
Sale Price		£30 - -

Net Profit 16 5% on Gross Cost
or 14 2% on Sale Price

COST LEDGER

Order No

Customer

Particulars

Date of Order
Delivery Promised.

SUMMARY OF COST

		Cost per Article
Material Labour Expense		
Total		

Dr *Cr,*

Date	Details	Ref.	Special Purchases				Disbursements				Stores				Wages					Expense				Total			Date	Detail	Ref	Amount.		
				£	s	d		£	s	d		£	s	d	SHOP A		£	s	d	Rate	£	s	d	£	s	d				£	s	d
			Fo				Fo				Fo				Fo	Hours																
															SHOP B																	
															SHOP C																	

not assembled in the form of a Cost Ledger till the calculations are completed and closed is another method of compiling final results

This method may be used in conjunction with a well organized filing system in which the original data pertaining to each order are filed, the cost sheet remaining in the docket and being entered up at inspection stages and closed on completion

(3) In other cases wages and material are summarized on entirely separate sheets, which are combined in the making up of the final cost This has a certain amount of convenience in enabling the wages and stores sections of the Cost Office to work on the same records without hindrance

This method is particularly adapted for the use of mechanical posting, an automatic check is obtained and a large amount of detail can be handled promptly

(4) Actual detail costs of specific items may be taken out only in special cases and the purpose of the accounts is then to give information in the shape of costs of running departments, processes or machines, which will serve to check the results in the detailed calculations and ensure their accuracy

It is essential to adopt this method when the individual jobs are small in value and complex in detail It is also useful when the products are mainly standard and variations from the average can be calculated or gauged by special test

It must be borne in mind that the main points to consider are—

(*a*) The amount of detail required in the Cost Records

(*b*) That the results must be obtained as promptly as possible

(*c*) That comparisons of results must be possible both in the total cost of jobs and in the detail of such costs

The amount of detail required in each cost will vary in every case Where detailed costs are regularly recorded it is usual for each order which has to be executed in the works to be divided into production orders, each being specified with a works order number, and the costs will be booked against each works order number as the work goes through A separate Cost Account will accordingly be opened in the Cost Ledger for the works order number and the total cost of each part will be obtained under these heads The cost of the job will then be found by assembling the totals of the works orders

Another method which may be adopted is to record costs against part numbers and drawing numbers on each machine or other product with the object of obtaining yet more detailed records, and when this is done the stores and wages charges will be specified against the part numbers, etc , in detail

It appears preferable from a practical point of view to obtain the cost results in total against works order numbers, and to dissect the charges against these works order numbers over the parts and operations according to the detail shown in stores requisitions and wages tickets, in order to build up the detail cost of manufacture of the assembled parts

Cost Ledger Ruling.

In some cases a saving can be made in the amount of clerical work required for the recording of oncost details by inserting in the Cost Ledger ruling a series of columns, one for each department in which there is a different oncost rate, inserting also the hours in each case if hourly rates are used By this means the total of each column furnishes the amount on which oncost for each department is based and this calculation requires to be made only at the conclusion of each job

In such cases a reserve must be made for the amount of oncost on Work-in-Progress at the time of closing the books for stocktaking purposes. This will be done by charging the amount to a Cost Ledger Oncost Suspense Account (crediting Oncost Account or Works Expenses Account) The amount of oncost is calculated upon the total obtained from the records in the Cost Ledger of uncompleted jobs At the commencement of the following period the entry will be written off against the expenses charged to jobs in the current period

Where, however, the oncost rates are too numerous to make this method practicable, it is essential for the oncost to be summarized week by week with the wages abstract in order to obtain the oncost charges to each job Where departmental rates are in use the totals of wages in each department on each job may be used for arriving at the department oncost to charge to the Cost Ledger, and the total wages in each department will furnish the total amount of oncost for the period Where machine rates are in use the oncost charges should be summarized on the Wages Piece Work Notes or Day Work Tickets, and an abstract of these amounts will be required for arriving at the amount of the total oncost and the charges to each job

Cost Ledger Postings

The postings to the Cost Ledger will embrace—

(1) Items from the financial books including postings from Purchase Analysis Book for goods supplied direct to contracts, postings from Petty Cash Book for travelling and hotel expenses paid to workmen and others visiting the job and any similar items which do not come through the abstracts of material and wages In the financial books these items are posted individually or by means of the monthly totals of analysis column provided for the purpose to appropriate accounts and summarized to the debit of Cost Ledger (or Work-in-Progress) Account

(2) The summary of materials issued from stores prepared from Stores Issue Notes should be recorded in a Materials Abstract Book month by month or journalized The details of direct materials are posted to the debit of the jobs

concerned, and in the financial books the total of these items come to debit of Cost Ledger (or Work-in-Progress) Account items chargeable to Expense Accounts, including repairs, are posted to those accounts in the Nominal Ledger, and the total amount is credited to the Stores Account

(3) Similarly with the wages abstract the total wages on productive work will be charged to the individual jobs in the Cost Ledger and debited in the financial books to Direct Wages for the Cost Ledger Account (or Work-in-Progress Account) Wages chargeable to expense items will be debited to Expense Accounts in the Nominal Ledger and the total amount of wages earned credited to the Wages Account

(4) Oncost postings will be made from an oncost or works charges summary to the debit of the jobs in the Cost Ledger and in the financial books for the debit of Work-in-Progress Account, the total will be credited to Oncost (or Works Expenses) Account

(5) It may be desired to include all charges against the job in the Cost Ledger Account and so to debit each account with the amount of General Oncost chargeable to it on its completion, also to credit the sale price and debit the resulting profit

(6) Transfers from other Cost Accounts, e g from Stock orders for batches of standard parts which are still in progress

(7) When the job is complete the cost account must be made up and closed, and a monthly summary of closed cost accounts should be agreed with schedule of goods shipped from works or put into warehouse The credit to the job will be

(*a*) Works cost, if general oncost and profit are not included in Cost Ledger entries, in the financial books Work-in-Progress Account is credited and Trading or Finished Goods Account debited

(*b*) Gross cost, if general oncost is charged in the Cost

Accounts, in this case a summary of general oncost charges will be made as the jobs are closed In the financial books the entries will be as in (*a*), the total of general oncost being credited to General Oncost Account and debited to Work-in-Progress Account monthly

(*c*) Selling Price, if the profit on each job is to be shown in the financial books the entries as in (*b*) will be required, but a summary of the Cost Ledger Profit and Loss balances will agree with the profit shown by the Trading Account

Each Cost Number requires a separate folder or filing case in the filing system This folder will contain the copies of original order, works orders, wages and stores notes, etc, as these pass through the Cost Department, and when making Cost Ledger postings the original wages tickets and stores requisitions should be available for checking off with the works order and specification, so that an independent check will exist by which it is ensured that the bookkeeping records against the job will actually tally with the wages and materials expended upon it

A complete detailed cost of each job (or of special jobs only) showing material, labour, and expense in connection with each part and operation may be made by referring back to stores issue notes and wages tickets

Classes of Orders.

A natural division will fall into the following groups—

(1) Sales Orders classified in suitable sections,
(2) Sales Repair Orders,
(3) Stock Orders,
(4) Works Extension Orders,
(5) Guarantee and Maintenance Orders

Each class of order should be easily distinguishable by colour of form used, or by a coding number

Stock Orders (3) are for the preparation in bulk, of parts required in the assembly of Sales Orders, such parts on completion will be deposited in "Finished Stores"

In a factory producing standard articles they will form the earlier stages of almost all the work executed

Orders for works repairs may be carried out in the same manner as if the work was for outside customers, full detail of time and materials used being recorded, but to simplify these records it is often the rule to charge up to Standing Orders numbers instead of to individual accounts

The amount of clerical work required in the abstracting of material and wages can be very considerably reduced by the use of mechanical methods Stores issues, instead of being summarized by hand in order to ascertain the total charges to jobs, should be sorted into job numbers and mechanically listed Similarly with wages dissections, if a separate wages ticket is provided for each job, the tickets, having been agreed with the men's total time for the preparation of the pay roll, should be re-sorted and listed to obtain the charges to the jobs In large businesses, by the use of the sorting and tabulating machines, the method adopted is to punch a card for each item of stores issued or each wages item and by first sorting to obtain the credits to the Stores Accounts or to individual workmen, and afterwards re-sorting under the job number, the charges to the job are obtained automatically This method has the advantage not only of reducing the actual clerical work, but of furnishing the results in a very much shorter space of time

The same advantage is obtained in compiling periodical statements of cost results, the mechanical sorting and summation reducing considerably the time required for the work

Repairs and Extensions.

When work of this nature is undertaken by the employees of the works it is advisable to distinguish clearly at the outset whether the charge is to be made against revenue as a repair or renewal, or whether it is to be placed to the charge of capital outlay as an extension In order to avoid the complication which arises in the financial accounts where oncost is charged on repair work

(1) Resulting in charges being brought into the financial books for repairs in excess of the actual outlay, and

(2) Increasing the total expenses beyond the actual figure,

it is advisable not to charge oncost upon repairs

For this reason it is preferable for repair charges not to be made against separate cost accounts in the Cost Ledger This can be avoided by dealing with repairs under expense numbers and using special subdivisions of these expense numbers when the cost of individual items is to be obtained, and such items can be abstracted independently for control and statistical purposes The handling of oncost is considerably simplified if this can be arranged at the outset

When indirect expense is added in computing cost of repairs, such an amount should be set off against overhead expenses of departments in which the work is performed, and deducted from the total establishment expense obtained This is illustrated in the schedule, page 89

In the case of extensions and additions to plant the position is different because such items may be correctly regarded as productive work and the cost of them is not only the material and wages laid out, but the actual amount of works charges incurred upon them, and the usual rates of works oncost for the departments in which the work has been done may be charged upon such work

In some cases a more conservative method is adopted of only charging a low rate of oncost upon extensions and this has the effect of keeping the plant, etc, accounts at a lower figure than would otherwise be the case, and consequently reduces later the charges for depreciation

Productive Services

In some departments the nature of the work makes it difficult to allocate the charges specifically to each job, and it becomes an advantage to summarize all such charges to one account and to charge the job for the service performed at a standard scale Typical items of this kind would be Painting and Packing Departments, and a Test Department can be satisfactorily run on a similar basis The wages and materials and works expenses of each department are then charged to a Cost Account for the department in the Cost Ledger, which is credited with the charges made to individual jobs which have passed through the department A standard scale is fixed in each department by which different jobs will be charged according to the average of similar previous cases In the Test Department it is important that a statistical record should be kept of the cost of each test for future reference

The following Test Department Account will illustrate the plan adopted

TEST DEPARTMENT

To Direct Wages per Abstract		By Charge on Jobs—	
,, Sundry Materials		No	
,, Salaries per Allocation		No	
,, Power used—do		No	
,, General Works Expense—do			
Balance of Charges in excess of Expenses carried to Monthly Trading Account (if any)			
	£		£

It is usual for a Foundry Account to be dealt with in a similar manner

Balances arising on these accounts should be written off month by month to the Manufacturing Account

Drawings, Tools, Jigs, Dies, Patterns, Etc.

The best method of dealing with the items under this head will depend upon the nature of the work for which they are undertaken Where the jobs are standard and in no way special the charges incurred will be capital outlay and should be charged to Tools, Patterns, etc, Accounts, and written off through the works oncost to the job accounts, spreading the outlay over a limited number of years (say 3 or 5)

Where the work is special and it is not expected that the same work will have to be repeated it becomes obvious that all charges of this nature must be made part of the cost of executing the order and the entire cost must be written off against the job in hand

Where, however, although the work is not standard, it can safely be expected that there will be repeat orders the number of possible repeats within a reasonable period whether 5, 10, or 50 must be estimated and a proportionate amount written off the cost of the initial outlay against each job

The time of draughtsmen should be booked as far as possible to the drawings undertaken, and a percentage may be added to salaries for materials and expenses of drawing office

A Pattern Ledger will contain records of costs of Patterns and amounts written off to Jobs or by means of Expense Rates

Development, Research and Experimental Work.

Expenditure under the above headings will be charged in the first place to special accounts descriptive of each item , and, subsequently, will be written off either to special jobs, or through Works Oncost, probably over a short period of years

Waste and Scrap.

It is generally sufficient to credit the Manufacturing Account with the value of waste, etc , as and when sold , or to be more exact the waste should be passed into the stores to the debit of Waste Account under classified headings and the jobs concerned proportionately credited The sales effected will then be credited against the Stores Accounts and losses carried to Stores Depreciation

A difficulty arises where there are by-products utilized in further processes

1 The by-products may be charged to the processes which handle them at the market price, if this is obtainable

2 Where there is no market price and the material must consequently be regarded as having no value, where in fact it may be a matter of expense to dispose of it at all, it is obvious that no charge can be made against a subsequent process for dealing with such residue, or a nominal standard value may be used

3 The by-products which pass through subsequent processes may be credited to the process where they arise at ultimate value or selling price *less* cost of subsequent treatment

A more difficult problem arises where material bought in one form is partly used in a number of different ways, e g material which is cut up and portions utilized for different purposes, e g skins which are cut up for different uses, timber cut up to obtain special parts for particular purposes are cases of this kind In order to charge a fair amount of the original cost against each lot, an estimate of the value of the material in its final form may be used as a guide and the original cost may be apportioned accordingly

Financial Books.

In the financial books the accounts should be framed on the plan illustrated Materials used are credited to Stores Accounts which then show balances representing Stocks on Hand A Manufacturing Account is debited with material, wages and factory oncost, and credited with finished goods at factory cost The Finished Stock Account is debited with the same total for goods manufactured, and the balance of this account, allowing for increase or decrease in stock, gives the cost of goods sold This amount will be debited, along with any oncost balances from Oncost Adjustment Account to a monthly Trading Account

The Journal entries on page 125 make this clearer.

OCTOBER 31ST, 19

	£	s	d	£	s	d	£	s	d
Manufacturing Account—			*Dr*	4,194	–	–			
To Purchases Account for (*a*) direct purchases per Invoice Analysis Book	742	–	–						
(*b*) Stores Issued per Stores Issued Book	1,158	–	–						
							1,900	–	–
To Chargeable Expense Account for disbursements chargeable to Customers per Petty Cash Analysis							35	–	–
To Productive Wages Account for total per Wages Summaries							972	–	–
To Factory Expense Allocation Account for Expenses charged to Cost Ledger—									
Shop No 1	574	–	–						
,, No 2	246	–	–						
,, No 3	376	–	–						
,, No 4	91	–	–						
							1,287	–	–
per Oncost Summary									
Finished Stock Account—			*Dr*	4,436	–	–			
To Manufacturing Account for completed work per Cost Ledger Summary							4,436	–	–
Trading Account—			*Dr*	5,261	–	–			
To Finished Stock Account for value of Goods sold							5,236	–	–
To Oncost Adjustment Account for balance of Expenses not charged to Contracts							25	–	–

Corresponding entries in the Cost Journal will maintain a double entry system in the Cost Accounts and harmonize the Cost and Financial Books In the Cost Journal the first two entries only are required, and in place of Manufacturing Account, the Sundry Contracts per Cost Ledger Summary will be debited and credited respectively—

Sundry Contracts *Dr*
To Purchases
Chargeable Expenses
Productive Wages
Factory Expense
Finished Stock Account *Dr*
To Sundry Contracts

In place of the debits to Finished Stock Account (in both Journals) there will be debits to Sales Repairs Accounts for repair orders for customers, Works Repairs or Plant Repairs Account and Works Extensions or Plant Extensions Account for completed Works Orders representing work done on account of the factory

The Cost Journal is also useful for transfers when required from one Cost Account to another

Dr WORK IN PROGRESS OR MANUFACTURING ACCOUNT *Cr*

19		£	s	d	19		£	s	d
Oct 31	To Work in Progress	1,784	–	–	Oct 31	By Work in Progress carried forward	1,302	–	–
,,	,, Material	1,900	–	–	,,	,, Finished Goods Account	4,436	–	–
,,	,, Disbursements	35	–	–	,,	,, Plant and Machinery Additions	240	–	
,,	,, Labour	972	–	–					
,,	,, Factory Oncost								
	No 1 Shop	574	–	–					
	No 2 Shop	246	–	–					
	No 3 Shop	376	–	–					
	No 4 Shop	91	–	–					
		£5,978	–	–			£5,978	–	–

Dr ONCOST ADJUSTMENT ACCOUNT *Cr*

19		£	s	d	19		£	s	d
Oct 31	To Balance				Oct 31	By Balance			
	No 1 Shop	115	–	–		No 2 Shop	20	–	–
					,,	No 3 Shop	55	–	–
					,,	No 4 Shop	15	–	–
					,,	,, Trading Account	25	–	–
		£115	–	–			£115	–	–

No 1 SHOP ONCOST ACCOUNT

Dr		£	*s*	*d*		*Cr*	£	*s*	*d*
19 Oct 31	To Rent and Rates	55	–	–	19 Oct 31	By Manufacturing Account, 4,592 hours @ 2/6	574	–	–
,,	,, Heating and Lighting	37	–	–	,,	,, Oncost Adjustment Account	115	–	–
,,	,, Power	149	–	–					
,,	,, Indirect Wages	125	–	–					
,,	,, Insurance	34	–	–					
,,	,, Repairs	24	–	–					
,,	,, Depreciation	70	–	–					
,,	,, General Factory Oncost	145	–	–					
,,	,, Sundry Expenses and Sundry Stores	50	–	–					
		£689	–	–			£689	–	–

FINISHED STOCK ACCOUNT

Dr		£	*s*	*d*		*Cr*	£	*s*	*d*
19 Oct 1	To Stocks on Hand	1,530	–	–	19 Oct 31	By Trading Account (Cost of Sales)	5,236	–	–
,, 31	,, Manufacturing Account (Cost of Goods Manufactured)	4,436	–	–	,,	,, Stocks on Hand	730	–	–
		£5,966	–	–			£5,966	–	–

TRADING ACCOUNT

FOR THE MONTH ENDING 31ST OCTOBER, 19

	£	*s*	*d*	£	*s*	*d*
By Sales				7,450	–	–
To Sales Returns	357	–	–			
,, Allowances	36	–	–			
				393	–	–
Net Sales				£7,057	–	–
Less Cost of Sales	5,236	–	–			
Oncost Adjustment Account	25	–	–			
				5,261	–	–
Gross Profit				£1,796	–	–
To Office Expenses—						
Salesmen	403	–	–			
Advertising	200	–	–			
Office Salaries	267	–	–			
Discount	135	–	–			
General Expenses	271	–	–			
Bad Debts	15	–	–			
				1,291	–	–
Net Profit				£505	–	–

Work-in-Progress is the name given to uncompleted contracts of a contractor at any time or the work in hand of a manufacturer At stocktaking time it must be valued at Works Cost (See notes on Contracts Accounts, pages 52 and 53)

Work-in-Progress Account

A Work-in-Progress Account (also referred to as a Manufacturing or Cost Ledger Account) in the financial books will take the form of a controlling account for the Cost Ledger All the items debited to the individual cost accounts form part of the totals which are debited month by month to the Work-in-Progress Account Against these debits there will naturally be credits in the financial accounts to wages, stores, oncost, etc The account will be credited with works cost of completed work transferred direct to Trading Account or Finished Stores

Where this system is carried out it seems unnecessary to use a double entry form of accounts in the Cost Ledger itself The Cost Ledger will become a detailed record similar to a Sales Ledger or Purchase Ledger where there is in the General Ledger a controlling account in the shape of a Bought Ledger Aggregate Account and Sales Ledger Aggregate Account At the same time it is essential for stocktaking purposes that details of the Cost Ledger Accounts should be summarized and the total agreed with the balance of the Work-in-Progress Account in the financial books, and any difference arising must naturally be traced if possible or written off Further there should be an inventory taken of the actual work in progress on the floor of the shops from which the Cost Accounts can be controlled

A series of Work-in-Progress Accounts may be arranged, one for each type of product or manufacturing department

Double Entry in the Cost Ledger.

A Cost Journal is useful for recording weekly total postings, passing closing entries and transfer entries, and by its use the Cost Ledger may be kept on Double Entry lines This method is useful when the financial accounts are not adapted so as to conform to the Cost Ledger method in the use of a Work-in-Progress Account

SUMMARY OF COST JOURNAL ENTRIES
AND COMPARISON WITH FINANCIAL BOOKS

	Cost Ledger *Dr*	Cost Ledger *Cr*	Financial Accounts *Dr*	Financial Accounts *Cr*
Wages	Cost Account (in detail)	Work in Progress or Manufacturing Account	Manufacturing Account	Productive Wages Account
Special Purchases	Cost Account (in detail)	,,	,,	Supplier
Stores	Cost Account (in detail)	,,	,,	Purchases Account
Disbursements	Cost Account (in detail)	,,	,,	Chargeable Expenses Account
Expenses (i e Oncost)	Cost Account (in detail)	,,	,,	General Expense (or Oncost) A/c.
Oncost on Work in Progress	Oncost Suspense A/c	,,	General Expense (or Oncost) A/c Work in Progress	Expense Accounts (in detail) Manufacturing Account
Value of Work in Progress	Total of open Job Accounts (including Works Oncost)		Trading Account	Manufacturing Account
CLOSING ENTRIES				
Sales Orders Sales Repair Orders Building and Plant Repairs Building and Plant Additions Stock Orders Tool Orders	Manufacturing Account	Cost Accounts (in detail)	,, Repairs Account Plant, etc Account Stores Account Tools Account or Repairs Account	Manufacturing Account

Entries reconciling difference between actual expenses and oncost charged, or difference between Cost Ledger profit and Profit and Loss Account profit—so far as made up of the same factors (i e excluding Investment Income received, etc).

TRADING ACCOUNT *Dr* or *Cr* for difference in Works Oncost PROFIT AND LOSS ACCOUNT *Dr* or *Cr* for difference in Office Oncost	GENERAL EXPENSES ACCOUNT *Cr* or *Dr*

The balance of the Cost Ledger Manufacturing Account carried forward will form a credit entry, agreeing with the debit balances on uncompleted Jobs, shown in Cost Ledger Summary

Values of Stocks in Stores Account, and Sales Account for selling values of completed work may be introduced into the system

Monthly Summary—Monthly Balance Sheet.

A Monthly Summary abstracted in detail will show—

(1) Total of completed work, grouped in sections according to arrangement of Cost Ledger Accounts, and showing details of expenditure on each order number

(2) Total of Work-in-Progress for balancing with financial accounts, the financial accounts Work-in-Progress Account may be arranged in corresponding sections and balancing is thus facilitated

(3) When the General Oncost and Profits are not shown in the Cost Ledger (as is often desired for reasons of privacy) the summary provides means for ascertaining whether the margins on each contract are sufficient to cover administration expense and amount of profit on each This requires a definite percentage on Factory Cost which can be checked month by month from the Counting House Nominal Ledger Summary of Expenses, and inquiry is at once possible in cases where the requisite percentage is not reached

(4) When a Monthly Balance Sheet and Trading Account are required the Work-in-Progress Account will furnish the value of Work-in-Progress and the Stores Control Account will furnish the value of stocks on hand

The Cost Accounts should also be systematically checked with the estimates on completion of each account, to discover errors by under or over-estimating and to inquire into all unsatisfactory results

Multiple Costs by Analytical Methods.

In many businesses, owing to the detail in costing, it is preferable to compile the cost sheet for each batch or order as the work proceeds through its various stages The initial entries are made use of for this purpose by assembling them on a work ticket for each job

A work ticket is provided, on which the different stages of manufacture and list of essential materials will be printed This ticket proceeds with the work

COST LEDGER SUMMARY

Month Ending 30th September, 19

Class of Work_____ Sales Orders_____ Brass Department

Order No	Name	Material	Labour	Disburse ments	Expense	Total.		Sale Price	Profit or Loss		Margin	
						Completed Orders	Uncompleted Orders				On Works Cost	On Sale Price
75C	Jones	£500	£234	£25	£468	£1,227	—	£1,750	£523	—	42 6%	29 9%
742Y	Williams	£245	£115	£30	—	—	£390	—	—	—	—	—
543R	Robinson	£756	£342	£56	£684	£1,838	—	£2,200	£362	—	19 7%	16 5%

round the departments and at each stage when material is issued the storekeeper enters particulars and value Similarly the wage for each process is entered as it is completed

Oncost is added to wage recorded by means of a percentage, or a series of rates is used for different departments, and in some cases a portion of the oncost is allocated to material and added as a percentage to each item of material used

The records then obtained consist of a series of results appertaining to individual orders and these will require to be reconciled with the financial accounts to ensure that the results are not merely approximate and of the nature of estimates to effect this the cost tickets for all completed work must be summarized weekly to arrive at the total of materials charged, wages charged, and oncost added This summary will then be comparable with the financial records

This method is suitable for clothing factories, glove making, boots and shoes, hosiery, furniture, and many other similar trades

In the printing trades a special method based on this principle is used, the oncost on material being especially to cover cost of maintaining purchase department, warehousing and handling of paper, etc, and the rates of oncost being subdivided in the form of machine rates for work done and departmental shop rates on wages to cover expenses in each department

Manufacture of Gloves—Multiple Costs.

The Cost Cards illustrated (Form 1) are issued with the orders in the factory, and the records of material are entered thereon by the storekeeper and wages by the foreman as the work proceeds through various stages till complete

Expense Rates are based partly on material and partly on labour, and these are filled in by the cost clerk The cost of production is thus obtained, and is available for comparison with the selling price

MULTIPLE COSTS GLOVES

FORM 1

COST CARD OF F 1 GLOVES

	Material and Wages				Expense		
	£	s	d	%	£	s	d
Date 15 5							
Quantity 50 *doz prs*							
Description *Ladies, H*							
Quality *Best*							
Colour *Grey*							
1 Material							
100 sq yds	45	–	–	10	4	10	–
2 Cotton	1	10	–	20	1	–	–
3 Buttons	1	10	–				
4 Button Pieces	1	–	–				
5 Bands and Pins		10	–				
6 Boxes		10	–				
Labour—							
A Cutting	1	–	–	50	2	7	6
B Sizing		10	–				
C End Tying		10	–				
D Buttoning & Pairing Binds		15	–				
E Tacking		7	–				
F Laying-out	1	5	–				
G Boxing and Banding		8	–				
H Slitting		10	–	150	15	7	6
I Pointing	1	–	–				
J Sewing	5	10	–				
K Buttonholing (2-button)	1	–	–				
L Binding	2	5	–				
Prime Cost	£65	–	–		£23	5	–
					65	–	–
Cost of Production					£88	5	–

Summaries (Form 2) may be made, or total output of each line may be costed weekly, and comparison made with materials used, wages paid, and expenses incurred Cost of production will compare also with sales, allowing for stock fluctuation

MULTIPLE COSTS—GLOVES (FORM 2)

ANALYSIS OF COST CARDS FOR WEEK ENDING____________________

MATERIAL. F Department.						WAGES F Department												OUTPUT in Quantities					
1	2	3	4	5	6	A	B	C	D	E	F	G	H	I	J	K	L	F 1	L 1	—	—	—	—
£ 45	£ s 1 10	£ s 1 10	£ 1	s 10	s 10	£ 1	s 10	s 10	s 15	s 7	£ s 1 5	s 8	s 10	£ 1	£ s 5 10	£ 1	£ s 2 5	50 dz	20 dz				

MATERIAL L Department.								WAGES L Department																
1	2	3	4	5	6	7	8	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
£ 50	£ 45	£ 36	£ 1	£ 10	£ s 1 5	£ s 2 10	£ 2	£ 5	£ 1	£ s 1 5	s 5	s 10	s 10	£ 2	£ 2	£ s 1 5	s 15	s 10	£ 1	£ 1	s 15	s 15	£ 5	£ 10

(The use of an Adding and Listing Machine simplifies this work)

MULTIPLE COSTS—GLOVES (FORM 3)

COST SHEET WEEK ENDING

	Week			*Total* 5 Weeks to date				Week			*Total* 5 Weeks to date		
	£	*s*	*d*	£	*s*	*d*		£	*s*	*d*	£	*s*	*d*
Material Purchased (or supplied to Depts)	420	–	–	2,000	–	–	Material per Cost Cards Analysis	400	–	–	2,025	–	–
Wages Paid	115	–	–	550	–	–	Wages ,,	130	–	–	565	–	–
Expense Summary per Financial Accounts	135	–	–	650	–	–	Expense ,,	125	–	–	630	–	–
	670	–	–	3 200	–	–	Cost of Output	655	–	–	3,220	–	–
Stock and/or Work in Progress brought forward	55	–	–	125	–	–	Increase or decrease in Finished Stock } Incr	25	–	–	75	–	–
	725	–	–	3,325	–	–	Cost of Goods sold	630	–	–	3,145	–	–
Less Stock and/or Work in Progress car fwd	75	–	–	75	–	–							
Balance showing agreement with Cost of Output	£650	–	–	£3,250	–	–							
							Margin for Office Expenses and Profit	70	–	–	175	–	–
							Sales per Day Book	£700	–	–	£3,320	–	–

The totals obtained on the form are carried to Weekly Cost Sheet (Form 3), where a comparative summary is shown

Routine in the use of Hosiery Cost Card is exactly similar

MULTIPLE COSTS HOSIERY

FORM 4

COST CARD

Date__________
Description _________
Size________
Quantity __________
Colour ________

Lot No ______
Wool ____ lbs ____ozs

	£	s	d	£	s	d
Sundry Material						
Knitter						
Cutter						
Machine						
Twin Needle						
Welter						
Button Sewer						
,, Hole						
Mender						
Sewing						
Examined by _______						
Total Prime Cost						
Cost of Manufacture						

Material, Wages, and Expense under each heading on this card require summarizing weekly in a general analysis for comparison with financial records

The keeping of continuous records may be confined to the department accounts and department oncost rates, in conjunction with special examination of individual costs at intervals

What the Cost Accounts Show.

The Cost Accounts will reveal—

(*a*) The profit or loss on particular work at different times and cost of stock lines,

(*b*) Means by which economical working or more economical processes may be secured and expenses controlled,

(*c*) Leakages in respect of time and material through inefficient use

The Cost Accounts further supply—

(*d*) Periodical Profit and Loss Statements independently of the financial accounts,

(*e*) A basis for future estimates, and they will also indicate—

(*f*) Possibilities of increased production,

(*g*) Opportunities of reaching wider markets by reducing prices

The Cost Accounts will be called upon to provide data on which decisions will be based as to future operations, and the following information in particular must be made available—

Whether certain work contributes its share to the general burden of expense

Whether the production of a certain class of goods causes additional expense which other articles are compelled to bear

Whether the capital and energy spent on any specialities could be better employed elsewhere

Whether it really pays to produce a certain class of goods at a small profit or at a loss, bearing in mind the possibilities of securing lucrative trade thereby in other goods

In addition to the cost of manufacture and expenses of marketing, there are many factors which may affect the fixing of a selling price including competition, demand, duration of demand, requisite capital outlay and return obtainable on same in comparison with yield on other manufactures

Reconciling Cost Accounts and Financial Accounts.

When the financial accounts are not framed upon lines which enable a link with the cost system to be established, the agreement of the two systems, in order to show that the profit obtained in the costs is also revealed in the Profit and Loss Account, must be sought as follows—

Wages Account in the financial books must be dissected to obtain— Direct Wages Indirect Wages	Direct Wages total will be capable of close agreement with wages charged to Cost Ledger
Purchases Account in the financial books must be dissected to obtain— Direct Materials Indirect Materials	Direct Materials used— i e Stocks of Direct Material at commencement of period plus purchases, less Stock at close of period should agree within close limits with Materials in Cost Ledger
Expenses chargeable to specific Jobs should be separately posted in financial books and, if not, must be obtained by dissection	and will agree with similar items in Cost Ledger
Summary of Works Expenses must be obtained from above dissection of Wages and Material with the items of Works expenses from Profit and Loss Account of the financial books	Measure of agreement with Works Oncost in Cost Ledger will indicate accuracy or otherwise of Oncost Rates and need for adjustment

General Expenses obtained similarly and agreed similarly with General Oncost

Material Reconciliation.

(1) FINANCIAL ACCOUNTS—

Purchases Account

		£			£
Jan 1	To Stock	10,000	Dec 31	By Stock	15,000
,,	,, Purchases	30,000	,,	,, Material used	25,000
		£40,000			£40,000

2 Cost Accounts—

	£	£
(*a*) Material charged to Jobs—		
(1) From Purchase Analysis		5,000
(2) From Stores Issues		18,000
(*b*) Material chargeable to Expense Accounts—		
(1) Material used on Repairs	1,000	
(2) Consumable Stores, Oil, etc	500	1,500
		24,500
(*c*) Material not accounted for		500
		£25,000

Due to—

(1) Waste or pilfering

(2) Variations from cost in pricing of requisitions

(3) Stock depreciation, or fall in value of stock

(4) Calculation or posting errors

CHAPTER XII

FOUNDRY ACCOUNTS

A FOUNDRY or forge is always treated as a separate department in Cost Accounts A foundry record shows particulars of the meltings each week, weight of material mixed (less scrap and spoilt work) and details of castings made The working expenses are summarized in full detail, and the week's allocation is brought into the cost sheet

The cost of material used in each mixing is charged to the castings produced in proportion to their final actual (or calculated) weight

The expense cost for the week is similarly charged to the castings on the basis of weight, the total expense divided by the total weight produced, giving a charge per cwt to be made to each casting

WEEKLY COST RETURNS

(*a*) SUMMARY OF LABOUR AND PRODUCTION

Week ending______________

Direct Labour				*Production*			*Cost*
	£	s	d	CWTS	QRS	LBS	*Per Cwt*
Cylinders	16	7	–	34	0	0	9/7 41
Bench	16	4	6	37	0	0	8/9 16
Tool	11	12	–	20	1	0	11/5 48
Plate Work	17	11	–	65	0	0	5/4 8
Floor	12	9	–	54	1	0	4/7 08
Weights (no cores)	1	–	–	10	0	0	2/–
	£75	3	6	220	2	0	

Indirect Labour				*Production*			*Cost*
	£	s	d	CWTS	QRS	LBS	*Per Cwt*
Labourers, etc	17	4	–	220	2	0	1/6 72
Firemen	9	16	6	220	2	0	10 67
Softener	3	17	4	220	2	0	4 20
Stretcher	4	7	6	220	2	0	4 73
Pattern Finder	3	15	1	220	2	0	4 08
Coremakers	13	16	–	210	2	0	1/3 16
Dressers	16	8	–	220	2	0	1/5 85
	£69	4	5				6/3 41

(*b*) MATERIAL SUMMARY

Week ending________________

	£	s	d	£	s	d	Cwt
Direct Material—							
C Q L							
Pig Iron 154 2 0 @ £24 ton	185	3	3				
Scrap (30%) 66 0 0 @ 10/7½ cwt	35	6	–				
				220	9	3	
Total							19/11 5
Sundry Material—							
C Q L							
Sand 60 0 0 @ 11/4 ton	1	14	–				
Limestone 7 0 0 @ 50/- cwt	17	10	–				
Sundry Material	1	–	3				
C Q L				20	4	3	
= 220 2 0 @ 1/10							
Core-making Material—				1	15	1	
C Q L							
= 210 2 0 @ 2d							
Total							2/–
Castings with cores 2/–, without 1/10							
Coal and Coke—							
25 tons @ 70/–				87	10	–	7/11
Overhead Expenses							3/–

Record of work done is made by each man on a Weekly Casting Card Two columns are provided "Weight Cast"—"Weight Passed" The weight passed is summarized for the Production Records (*a*) Wages are paid at weekly rates, and an abstract of wages classified according to type of work gives the average wage cost of each class of castings Material summarized on Material Record (*b*)

FINISHED COST OF EACH CLASS OF CASTINGS PER CWT

Week ending______________

	Materials	Direct Labour	Coal and Coke	*Sundry*		Sundry Exps	Gross Cost.
				Labour	Material		
Bench	19/11 5	8/9 16	7/11	6/3 41	2/–	3/–	47/11
Plate	19/11 5	5/4 8	7/11	6/3 41	2/–	3/–	44/8
Floor	19/11 5	4/7 08	7/11	6/3 41	2/–	3/–	44/–
Cylinders	19/11 5	9/7 41	7/11	6/3 41	2/–	3/–	48/10
Tools	19/11 5	11/5 48	7/11	6/3 41	2/–	3/–	50/8
Weights	19/11 5	2/–	7/11	5/0 25	1/10	3/–	39/9

FINAL COST ACCOUNT

Week ending______________

PRODUCTION

	CWTS	QRS	LBS	CWTS	QRS	LBS
Bench	37	0	0			
Floor	54	1	0			
Plate	65	0	0			
Tool	20	1	0			
Cylinders	34	0	0			
Weights .	10	0	0	220	2	0

COST

	£	s	d	£	s	d	£	s	d	£	s	d
Material Direct—												
Pig Iron	185	3	3									
Scrap	35	6	–									
				220	9	3						
Wages				75	3	6	295	12	9			
Material Indirect—												
Sand	1	14	–									
Limestone	17	10	–									
Coremaking	1	15	1									
Sundry	1	–	3									
				21	19	4						
Wages Indirect .				69	4	5						
							91	3	9			
Coal and Coke							87	10	–			
Overhead Exps Weekly Allocation							33	1	6			
										£507	8	–

	CWTS	QRS	LBS		£	s	d
Cost of Producing	220	2	0	of Good Castings	£507	8	–

Alternative methods may be used for treating Indirect Wages and Overhead Expenses which are more suitable when the variety of castings is great The amount of Direct Wages is used in determining the expense allocations entirely; or in conjunction with the basis of weight

FOUNDRY COST SHEET

The cost of metal is calculated for each mixing by including Raw Materials, as—

	£	s	d	£	s	d	£	s	d
Pig Iron	£185	3	3						
Scrap	35	6	–						
Limestone	17	10	–						
Coal and Coke	87	10	–						
Wages of cupola and furnace men	9	16	6						
							335	5	9
equal to 220½ cwt at 22/6 cwt and based on the weight of each casting									
Direct Wages are booked to each job by—									
Moulders + % for Material	75	3	6 +	1	14	–			
Coremakers + % for Material	13	16	– +	1	15	1			
	£88	19	6	£3	9	1	3	9	1
and a percentage is added to cover the cost of Indirect Labour, say, 52%	45	11	11						
							134	11	5
Sundry Material and Overhead Expenses are added at a percentage on total labour, say, 25%							34	1	9
							£507	8	–

The Overhead Expenses chargeable to each group may be determined by the total wages of the group and a cost per cwt in each group thus arrived at

Where the Foundry is a department in an engineering works the cost of castings made should be compiled week by week and the castings sent into stores at cost price, i e Works Cost Castings are then drawn from stores for jobs as required on Stores Requisitions

The practice of charging castings to stores at market price in order to show a profit on foundry work is unsound in creating an artificial profit which may not be realized

If the Foundry is running at a loss the market price should be used and the loss written off at once

The profit on the foundry will be shown by a comparison of the current costs with the market price for similar work whether the castings are for stock or for sale immediately, and a Foundry Trading Account can be compiled to show the profit on sales of castings if desired

CHAPTER XIII

WORKS ROUTINE

ONE of the most valuable aids to the economical running of a factory is an efficient Planning Department, whose duties consist of—

(1) Saving of time by having work prepared for putting in hand immediately machines are at liberty ,

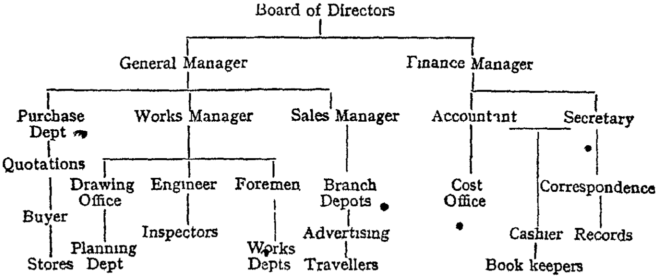
(2) Preventing delay in the progress of work through various departments ,

(3) The arranging of orders to provide for the prompt execution of urgent work ,

(4) The supervising of stores to maintain stocks to meet orders at hand

The concentration of these duties upon a special staff will make for increased efficiency in handling the work

To systematize the general routine a diagram of duties and responsibilities may be set out in the following form—



The success of a business is considerably influenced by the extent to which the technical management obtains criticism and assistance from the financial direction. In view of the fact that forecasts of production and estimates of the cost of manufacturing orders about to be undertaken are based upon the cost records of past work, it follows that promptitude and accuracy in the furnishing of costs are of greatest importance to efficient management, and the arrangement of works routine has an important bearing upon the facility and accuracy with which cost records can be obtained This does not imply that detailed individual job costs cannot be dispensed with to some extent where results can be obtained in group form, e g by departmental methods, because in such cases individual costs can be calculated from known details, and group records exist to prove the accuracy of the calculated costs So that to some extent the clerical work involved in obtaining continuous costs may be reduced In other cases this method is not possible owing to the variety in the work undertaken and an efficient method of Job Costing must then be used

Estimating Department.

Taking for the purpose of illustration the case of an engineering works, the original handling of inquiries will be dealt with by an Estimating Department, and in framing their tenders the Estimating Department should have at their disposal the results of previous work in the form of Cost Summaries They will also be in touch with the Stores and Buying Departments in connection with the stock and prices of materials, and with the wages and piece-work departments in respect of wages and piece-work prices, and should be advised of changes in oncost rates Obtaining from the Drawing Office detailed drawings and material specifications they will be able to prepare estimates in detailed form which will be available for comparison (when the work has been executed and costed out) with the actual cost results, and variations in the cost of work from the amount of the estimate can thus be traced Assuming that an order is received to be executed for a customer or that sanction is given for manufacture for stock, the Estimating Department will hand over the information they have obtained on the subject to the Planning Department, copies of the order or Master Card being at the same time circulated to other departments interested, e g Drawing Office, Jig and Tool Department, Buying Department, Progress Office and Cost Office.

Each Works Order will be given a serial code number denoting class of product and number in series Sub-order numbers will similarly be allotted to part orders, details of same being recorded on main order

The Drawing Office will revise the drawings to be used on the job and prepare exact specifications of the material required which they will hand over also to the Planning Department

The Planning Department from the Master Card prepares a Works Order for each section or principal part of the machine to be manufactured, copies being circulated as above, and such Works Order should be accompanied by material specification for the material required for its execution The separate jobs to be undertaken in the manufacture or assembly of the particular part will require a Job Card giving details of the work to be done, measurements and so on The Works Orders with drawings and Job Cards are passed to the Rate-fixers or Piece Work Office who schedule on the Job Cards the processes required, and prepare the Piece Work or Day Work Tickets for each item, fixing the Piece Work prices and inserting same on the Piece Work Tickets and Job Cards The Job Cards will then be sent direct to the Cost Office, or be retained by the timekeeper in the shops for record of the time taken to be inserted

The foreman is supplied with the Works Order, Wages Tickets and Material Specification and will prepare requisitions for material as he requires it When obtaining material he will present to the storekeeper the Material Specification on which the storekeeper will record the date against each item supplied, at the same time obtaining the workman's signature on the Stores Requisition Note which is passed to the Stores Office The Wages Tickets are sorted by the foreman so that he can have ready for each man a series of jobs to be taken up one after another, and a rack should be provided marked with the men's numbers in the shop so that the piece work notes for each man can be inserted under his number

As a job is finished the Time Clerk should record the exact time on both finished and new jobs, thus ensuring that accurate time recording is obtained In the event of a foreman not having a job ready or if the workman has to wait for a job to be brought, then a separate time ticket should be used to record the waiting time between one job and the next The finished Wages Tickets should be sent day by day from the shops to the Wages Departments, where they will be required in calculations for bonuses, and after the pay roll is completed and the bonus paid the wages Tickets should be sent to the Rate-fixing Department so that the information obtained can be compared With a view to correct rate-fixing At each week-end the Wages Tickets of unfinished jobs must be collected and fresh tickets issued in exchange by the foreman for the following week The Job Card will require to be entered up with the amount of wages paid for each process on the job as shown by the Wages Tickets, and this can be done either by the time-keeper in the shops or by the Cost Department who for this purpose will require the Wages Tickets to be handed to them by the Wages Office after the completion of the Pay Roll and before the Wages Tickets are returned to the Rate-fixers

It is preferable for work to be inspected before a bonus is authorized, and this can be done so as to allow time for calculation of bonuses when the wages payable on Friday or Saturday are made up only to the previous week-end The actual Piece Work Notes can then be summarized in the Wages Office to obtain the wages payable

In cases where wages have to be made up to Wednesday or Thursday night and paid on Friday or Saturday, the margin of time is insufficient for this to be done The wages payable will then consist of Time Rates for the actual hours worked, plus excess of Piece Work bonus above Time Rates for the week previous In any event the day wages and Piece Work bonus will agree with the total of the Wages Tickets, and the charges to the job will be made from the abstract prepared from the Wages Tickets.

It is a convenient plan for the shop clerk or time-keeper to keep a serial record of the Wages Tickets given to each man during the week, showing the job number and the total wages earned on each job and distinguishing between Productive work, Repairs and other expenses for other shops, and Indirect Expenses for own shop, and this is available for use in the Wages Office and Cost Department immediately On the other hand the time-keeper can also keep a record of the work done by different men on the same order number as on the Job Card specified above, thus bringing together the various processes of one job and forming a sub-analysis for Cost Office use, which again facilitates the preparation of Cost Records

Inspection and Test.

The Piece Work bonus should be authorized by the Inspection Department by the presentation of the work to the View Room before the Piece Work Notes are handed in, or by the signature of the Inspector on the Piece Work Note as he passes through the shops, or by the use of an independent inspection note, which is a duplicate of the Piece Work Note but of a different colour, being sent after inspection to the Wages Office authorizing the payment of the bonus shown on the Piece Work Note to have been earned The Cost Department will receive advices of the inspection, testing, packing and shipping of all machines and will require to close the costs for such jobs concurrently with the invoicing of same to customer

A summary should be prepared each month showing in suitable sections the items making up the sales with particulars of the main items of the cost of manufacture against each sale

Planning and Progress Departments.

In conjunction with the Planning (or Production) Department whose function may be limited to the arrangement of future work, preparation of Works Orders and specifications and the oversight of Stocks and future supplies of material, the Progress Department will take charge of orders in hand in the factory, watching their route and obtaining records of completed operations, obtaining reports of work held up for supplies of material—congestion of work in particular departments, etc Diagrams will be used to show the stage which each order in hand has reached

A production schedule should be laid down in advance and the Progress Department work then consists in facilitating in every way the accomplishment of the forecast

RATE-FIXING The difficulties of fixing correct rates for piecework or bonus systems can be overcome only by the skill of the Rate-fixer and his mechanical ability assisted by time studies and the use of detailed records of the time taken on the jobs

TIME ALLOWANCES The Piece Rates or Time Allowances fixed by rate-fixers should be stated in terms of time and not as prices per piece, and in addition to stating the time should also specify the machine at which the work is to be done and the grade of labour to be employed

To secure the co-operation of employees in obtaining maximum output, questions concerning the rectification of rates should be dealt with by shop committees consisting of, say, Foreman, Shop Steward and Rate-fixer acting for the purpose of adjusting any rates which are shown to be too low or too high In the latter case a safeguard for the employee is sometimes introduced by guaranteeing that no rate shall be reduced without corresponding increase of a rate claimed to be too low

Mass Production or Repetition Work.

The methods of organization known under this name have for their object the cheapening of production by—

(1) Standardization of work and processes, producing a high degree of efficiency and specialization,

(2) Employment of machines to the fullest extent in order to increase the product per employee,

(3) Arrangement of factory to avoid loss of time and labour in transferring work from one place to another,

(4) Saving time by continuous work so that there will be no loss through the changing of jobs, setting machines,

(5) Continuous flow of work simplifying wage systems, oversight and routine

If these methods can be adopted an increase of output for the same amount of capital will be obtained, and the indirect expense will be reduced Manufacture will proceed as authorized by sanctions for specific quantities of finished machines The main difficulty then arises in adjusting different supplies to keep pace with maximum output without overstocking For this purpose the Components Stores department will keep detailed accounts of stocks of parts and orders in hand

In various stages of manufacture varying methods may be employed—

(*a*) In the Foundry, costs will be made up as a separate department,

(*b*) Orders for parts for stock will be put through in large quantities under Works Order Numbers,

(*c*) Machines will be run continuously on standard work in processes,

(*d*) Assembly will proceed under direction of Progress Department,

(*e*) Variations from standard will be made on specific assembly orders.

Costing by Operations.

The special feature introduced in the costing in the case of (*c*) is that in the place of booking the time on particular work to its Order No, the operations which the work has to go through are scheduled and numbered, and time and wages are charged to each operation number One operation may comprise various processes and each may be numbered separately so that analytical records of cost at each process are available   Thus, if part " A " has to go through five operations, say A1, A2, A3, A4, A5, and in A5 there are ten processes these will be A5-1, A5-2, A5-3, and so on

SERIES OF OPERATIONS

Article No

Date Commenced

Withdrawn

Dept	Operations	Number

A series of cards will show operations on each part

Another series of cards for each sub-process will take the original entries from the wages (time or piece) cards, these Process Cards will be summarized on Operation Cost Cards

PROCESS COST CARD

Article ______________

Operation ______________ No________

Date	No	Wage	Production	Date	No	Wage	Production

The time cards also show quantities passed by the inspectors at each stage   From these records the Operation Cost Card is written up week by week for every part manufactured, showing—

(1) The average wage cost, in detail, of operations or processes per unit produced,

(2) The material cost booked to the same number, also arrived at per unit completed,

(3) Expense cost added at works or departmental rate

OPERATION COST CARD

Article________ No_____

Pattern No______ Date__________

Operation No	Dept	Processes	Average Cost	Average Cost.	Average Cost	Average Cost
		Total				

A weekly comparison of wage cost is made to indicate possibilities of more economical workings Spoilt work will be shown by records of pieces passed at each stage, and this cost must be included in calculating total expense of each operation

The supplies thus obtained will go into Finished Stores and other supplies of finished parts will be purchased, from these sources the finished machines will be assembled

A statement of weekly or monthly productions in the following form will be found useful for comparisons—

MONTH ENDING OCTOBER 21ST, 19

SHOP A ORDER X1627

Operation	Gross Production	Number of Work people	Actual Hours Worked	Wages Paid	Production per 50 hours per Worker	Time per Unit	Wage per Unit
			Hours	£		*Minutes*	*Pence*
Machining 1	30,000	31	5,900	350	254	11 80	2 80
„ 2	29,500	5	970	50	1,521	1 97	40
„ 3	29,400	9	1,690	70	869	3 44	51
„ 4	29,000	10	2,050	115	707	4 24	95
„ 5	28,970	13	2,450	148	591	5 07	1 22
Fitting	28,700	6	1,180	70	1 216	2 46	58
Grinding	28,500	5	950	64	1,500	2 00	53
Inspecting	28,000	9	1,750	175	800	3 75	1 48
		88	16,940	£1,042		34 73	8 47d

Quantity Passed, 28,000	
Average Total Time, 36 3 min	
Average Total Wage	8 93d
Cost of Castings — 5/ each equals per unit completed	64 28d
Factory Overhead Expense at 240% on Wages	21 43d
	94 64d

Assembling.

The parts required are tabulated in a *Material Schedule*, giving a detailed list of every part in the finished machine

The work to be done is also tabulated in an *Operations Schedule*, following the numbering for parts adopted in the Material Schedule

Each operation may consist of several minor processes which are similarly tabulated on *Operation Cards*

MOTOR PRODUCTION

WEEKLY STATEMENT OF COST PER CHASSIS

*Week ending*___________

MATERIAL—	£	£
Purchases of Finished Parts	120	
Stores Consumed per Detail Schedules	185	
	—	305
LABOUR—		
Machining .	20	
Erecting .	13	
Foundry .	4	
Sundry Labour	5	
	—	42
		£347
WORKS EXPENSE—	£	
Rent, Rates and Insurance	8	
Coal, Gas, Water, including Heating and Lighting	47	
Wages and Salaries	72	
Depreciation and Repairs . . .	20	
	—	147
		£494
INDIRECT EXPENSE—		
Rent, Rates and Insurance Office . .	3	
Lighting and Heating .	2	
Management and Office Salaries	55	
Discounts and Allowances	32	
Travelling, Advertising, Salesmen's Salaries	24	
General Expenses . .	15	
Interest	20	
	—	151
		£645

A continual weekly record is then prepared as follows—

In a MATERIAL SUMMARY each part is priced out at its cost price as purchased, or at factory cost if manufactured

In a Wages Summary is shown the cost of every operation (and process) according to the time booked to the number representing that operation during the period, divided by number of completed units to show cost of *operation per unit* completed for sale

Shop Expense Summary is prepared from financial books for same period similarly divided, and an appropriate percentage may be added to wages at each operation to provide the amount of Oncost required

The total of these schedules then shows total cost per unit week by week, and comparisons of *fluctuations in cost of manufacture* indicate possibilities of economy

Job Costing.

This method is also worked in conjunction with job costing methods where a machine is completed up to a certain point to standard pattern and then finished to suit customer's requirements

Unit System

Under this head a method of costing has been developed on the principle of a comparison between actual cost under detailed analytical heads and a standard cost basis prepared from an analysis of the normal products

This is particularly suitable when selling prices are fixed by competition, and the products are highly standardized

The weekly production total obtained by detailed record of all parts or jobs completed in the factory, represents in the Cost Office a certain value in material, wages and expenses, because every product is valued and analysed at a normal production cost These normal costs are tabulated, showing composition of the whole production in respect of total material, wage, and expense, and special prominence is given to the chief product from which the unit system is to be standardized

For convenience of reckoning, a decimal system is adopted by which the chief product is valued at a production cost of 100, its material, wage and expense cost being similarly expressed as percentages The production cost of every other product is similarly stated in terms of its percentage at a normal cost to the adopted standard, and its material, wage and expense costs in each case are stated in decimal terms showing the ratio which the product or part bears to the standard A complete tabular statement can be worked out on these lines embracing every product in the works, and once settled this Cost Schedule remains in use Being in decimal form it is easy to work from, and the plan is further simplified by the work being put in hand invariably in lots of ten or multiples of ten

In the Stores System, the value of stores is expressed in similar decimal values, determined from the standard prices adopted for the different parts or material, variations in purchase prices from standard are regarded as a loss or a profit in buying, and are thus eliminated from the Cost System Issues of stores are consequently always in accordance with Cost Schedule

Wages are either paid at piece rates corresponding throughout with the prices fixed in the Standard Cost Schedule, or, if paid by time, the output is recorded so that detailed comparisons can be made and any losses (or profits) as against the schedule can be recorded

Expenses are assigned on standard basis, in detail, to the products in the Cost Schedule (either as a percentage on wage, or by other predetermined methods to suit individual circumstances—in some cases as a percentage on Prime Cost) and the total compares week by week with actual current outgoings

From the Detailed Production Total expressed in quantities turned out, there will result week by week a summary expressed in decimals of the standard product of the—

(*a*) Total Production for the week,
(*b*) Material }
(*c*) Wages } represented by that production
(*d*) Expenses }

The total production will indicate whether the factory has accomplished a satisfactory volume of work for the week, and this can be converted into production in £ s d by multiplying the decimal total by value of Standard Product on which the whole system is based The same conversion can be made in any item in the same way

The material total balances the Store Records and when converted into £ s d indicates the consumption of stores for the financial books

The wages total is similarly converted, and is subject to adjustment in respect of any wages paid above or below the standard, which is shown by a comparison with actual wages paid

Expenses compare similarly with the Counting House Records

Prompt returns are available under the system and periodical comparisons indicate the line in which the business is tending It is particularly suitable where standardized products are being made

It has the advantage of showing—

(1) Total production in quantity irrespective of price fluctuations, which for comparisons of turnover is vitally important,

(2) Wage cost comparisons in a form which can be compared with output of a corresponding quantity of work,

(3) Expense per unit produced which indicates degree of efficiency in production reached from time to time. A description of this method will be found in *Multiple Costs* by H L Garry

Standard Costs and Inter-Departmental Trading Accounts.

The method of standard costs is to institute departmental trading accounts in the factory for the purpose of showing the amount which each department gains or loses against the scheduled cost of performing the work allotted to it

The method appears to have real utility when the work is standard and can thus be used to take the place of detailed job costs

Each department being charged with the wages paid, indirect materials used, spoilt work and allocations of overhead expenses is credited with the estimated value of the work performed and the profit or loss can be obtained week by week from these records

Detailed calculations can be made of the cost of special jobs, but the normal cost of completed work will be the cost of direct material which will from the outset be charged upon it, plus the allowance to each department for work performed

Oncost rates for departments or machines will be required for such calculated costs and for charging from one department to another any work done in one department originally allocated to a different one

Duties of Cost Office.

The chief duties of the Cost Office thus are—

(*a*) To maintain correctly the routine in connection with the keeping of the Cost Ledger, entering therein to each account the cost of—

Material from the Requisitions,

Special purchases and disbursements from the Counting House books,

Wages from the Wages Abstract,

Expenses or Oncost at the rates fixed

(*b*) If responsible for prices, to see that these are based on actual cost

(*c*) To ensure clerical accuracy by observing that material and wages charged to each contract or order are in accord with the specification of the respective Works Order and that Wages Abstract is agreed with gross wages of Pay Roll, and Stores Issues Summary agreed with credits to Stores Accounts

(*d*) To maintain frequent reconciliation between the expense or oncost charged in the Cost Ledger and the current expenses as shown by the financial books

The Accounts Department should compile the monthly expenses summary with the assistance of the Cost Office dissections, and the Cost Office uses the monthly expense summary for departmental allocations

(*e*) To allocate correctly expenses as between departments in fixing rates in accordance with the burden that should be borne by each, and to distribute such expenses over the work on sound principles

(*f*) To draw up cost sheets suitable for the works and institute detailed instructions for their use

(*g*) To take steps to ensure the handing in promptly to the office of the necessary records as compiled in the works, duly certified by the officers responsible (foreman, storekeeper, supervisor), and to take charge of such records

(*h*) To install a system of preservation of records and of easy reference thereto

(*i*) To establish methods of routine to keep in touch with the Counting House as to raw material purchased, wages paid, expenses analysed, etc

The work must always be up to date, and so arranged as to provide information to the management immediately it is called for

Machines for Reducing Costing Work.

Machines in use for obtaining results more speedily and with less clerical labour include the Burroughs Adding Machine, the Comptometer, and other calculating machines, the Wages Payroll Machine, Ledger Posting Machine, the Hollerith Sorting and Tabulating Machine, the Powers' Machines, and similar appliances The sorting machines work with cards on which the records are punched instead of being written The machine can be set to sort these into any desired classification and the totals can be quickly obtained in the tabulating machine These are economical where the records run into many thousands, but the usual type of adding machine can be put to advantageous use in all large offices

CHAPTER XIV

OPERATING (WORKING) COSTS

In this class are included the costing records of railways, tramways and similar concerns performing services rather than producing goods, where there is a single unit as in Single Costs, but of a different type

Hence the work performed is measured in train-miles, wagon-miles, or ton-miles, car-miles or passenger-miles

Classification of expense is made according to the Service departments, such as in the case of railways—

Maintenance of Ways, Works and Stations, including Staff and Repairs,

Locomotive Power, including Staff, Fuel, Oil and Repairs,

Carriage and Wagon Repairs, including Staff, Wages and Material,

Traffic Expenses, including Staff, Stores and Cartage Expenses,

General Charges

Motor Haulage.

A more usual example occurs in the case of motor haulage businesses The costing is made from drivers' diaries of loads carried, which are summarized in a weekly statement A comprehensive weekly return is then prepared from these statements

The amounts from the weekly summaries should be totalled week by week until a quarterly sheet is obtained, which should be agreed with the financial books, and thus furnish a valuable analysis of the costs

The unit of a ton-mile represents the carriage of 1 ton for 1 mile, so that the total ton-miles is the sum of the products of miles and tons on each load

THE SYREN MOTOR HAULAGE CO

SUMMARY OF DRIVERS' WEEKLY STATEMENTS FOR THE WEEK ENDING

						Total Expense and Earnings
Driver	Jones	Brown	Fox			
Machine	1	2	3			
Total Miles	150	200	100			
Total Loads in Ton miles	360	400	150			
Running Costs—						
Wages	£6	£7	£4			
Petrol	2	3	1			
Oil	–	1	–			
Tyres	5	–	–			
Repairs	–	15	2			
Licence and Depreciation	5	10	3			
Total	£18	£36	£10			
Cost per Ton mile	12d	21 6d	16d			
Earnings	£28	£33	£12			
Balance	£10	£3 Loss	£2			
						£

PETROL RECORD

*Week ending*______________

	Galls	£	*s*	*d*		Galls	£	*s*	*d*	Miles Run	Miles per Gall
To Stock					By Supplies to Motor 1						
„ Purchases					„ „ 2						
					„ „ 3						
					„ „ 4						
					„ Travelling Account						
					„ Engineers						
					„ Loss in Quantity						
					„ Balance in Hand						

MOTOR RECORD

No 1
Maker Austin
Description
Date of Purchase
October 15th, 19 .
Cost £1 100

Week	Mileage	Ton Miles	Petrol	Tyres	Repairs	Running Cost per Ton mile
Nov 29	150	360	£2	£5	—	12d

A detailed record of Petrol, Oil, Tyres and Repairs is maintained, also a record of cost in respect of each machine, showing the number of miles run and quantity of load carried in ton miles

OPERATING STATEMENT OF ELECTRICITY GENERATING STATION

FOR HALF YEAR ENDING 31ST DECEMBER, 19

OUTPUT 200,000,000 UNITS

			Cost per Unit			Per Unit
To Generation of Electricity—		£		By Sales of Electric Current—	£	
Coal		305,000	366d	Light, Power, Heating	695 000	
Oil, Waste, Water and Stores		12,000	014d	Traction	145,000	
Sundries		3,000	004d	Street Lighting	3,000	1 012d
Compensation Accidents		400			£843,000	
Salaries of Engineers		8,000	010d	By Rentals—		
Wages		43,402	052d	Meters	366	
Repairs—	£			Time Switches	160	
Buildings	3,200			Motors	13,075	016d
Machinery	40,400	43,600	052d		£856,601	1 028d
		£415 402	498d	By Sales of Steam	3,000	003d
To Distribution—				Rentals	1,477	002d
Salaries	6,000		007d			
Wages	26,000		031d			
Sundries	3,000		004d			
Street Lighting	1,000		001d			
Repairs and Maintenance Mains etc	37 202					
		73,202	045d			
To Rent and Rates		44,584	054d			
To Management Expenses, etc		26,753	032d			
		£559 941	672d			
Balance to Net Revenue A/c		301,137	361d		£861,078	1 033d

To Interest	£77,600	By Balance	£301,137
,, Income Tax	34,690		
,, Sinking Fund	165,200		
,, Net Profit	23 647		
	£301 137		£301,137

CHAPTER XV

COST RECORDS AND REPORTS

Expense Control.

THE need for correct detail in Expense Accounts cannot be too strongly emphasized, and the allocation of expense should be made on equally accurate lines, so that the expense charged at any point may be traced and verified

Authority in the Purchase Department may be specifically delegated to those who have close acquaintance with different classes of materials, with buying limits in each case and close control of the exercise of buying discretion may be secured

Supplies of Sundry Stores and Small Tools to individual shops may be controlled by a system of rationing, any excess beyond the scheduled allowance requiring special sanction

The extent to which foremen are familiarized with works expense varies, and there is much to be said for a system by which each foreman is given month by month a summary of such expenses chargeable to his shop as come under his direct control e g cost of indirect labour, cost of sundry stores, general repairs, so that by acquiring his appreciation and interest these and similar items may be economically managed

On these lines a regular system of expense reports, subdivided in classes corresponding with the responsibilities of director, managers and foremen, and giving the detail of each expense in separate schedules at each stage, may be a means of obtaining effective control of indirect expenses.

Similar management reports on production, with analysis showing production per hour, per machine per hour, or production per man per hour, and comparisons with previous records and corresponding periods of other years, cannot fail to prove their value Similarly, reports of cost per unit in different operations can be adopted in many businesses

SCHEDULE OF WORKS EXPENSE

General Works Expense—				
Timekeepers				
Storekeepers				
Transportation				
Power House				
General				
Shop Expense—				
Rent and Rates				
Stores				
Insurance, Heat, and Light				
Indirect Wages				
Repairs				
Machine Expense—				
Power				
Tools				
Idle Time				

Production Reports

Where it is possible to arrive at a standard unit of production, the cost of productive wages and shop expenses may be usefully measured in terms of such a unit, and the number of units per hour of working time in different periods may be usefully compared Even if the same unit is not applicable throughout the factory, different units may be used in different departments and the advantage of periodical comparisons is obtained

A common unit may be based upon the number of tons of finished work, or the number of units of specific articles, or the products may be individually rated in points based on the number of labour hours estimated to be required in doing the work Reports are then required to show the number of units per hour week by week from each department and the amount of productive wages per working hour, and consequently wages per unit of work Similarly shop expenses in each department per working hour and consequently shop expenses per unit of work Where a variation of these records shows inquiry to be necessary the details of shop expenses or workmen's time on different jobs will indicate the cause

In some cases a uniform unit can be applied to the whole of the production of a factory In the rubber industry, for example, the material will proceed from one stage to another in exactly the same form up to the moulding stage, and will then be treated in the different ways for the purpose of producing different articles The cost per pound of finished products will not indicate correctly the actual cost of any of the products, but if the assortment of products remain normal the cost per pound will be a useful efficiency index and the individual costs of specific products may be obtained by calculation or will vary in accordance with scheduled percentages above or below the average The expense of maintaining detailed cost systems can by this means be very largely avoided and a simpler plan of cost resorted to, by which the total weekly or monthly production costed out on the basis of the average cost plus or minus the known percentages, will absorb the direct and indirect charges involved in the production

Cost Records.

In addition to the Cost Ledger Accounts, a detailed record of Buildings, Plant and Machinery should be kept in the Cost Office

BUILDINGS RECORD The rulings on the next page for a Buildings and Fixed Plant Ledger will show the information that should be recorded therein The values must be written down to provide for the time when replacement will have to be made, and the register will show the amount ta which each item stands from time to time

Expenditure upon repairs and alterations should be entered, but is not added to the value

Expenditure upon additions and extensions must be added to values at date and depreciation must be increased accordingly

Sufficient space must be given to each item to allow for additions and notes of repairs

BUILDINGS AND FIXED PLANT LEDGER.

No	Description	Location	Original Cost	Date	Depreciation					Value	Remarks
					Yr	%	£	s	d		

Plant and Machines A ruling for a Plant Record is given on the next page, a separate account or card serves to record the history of each machine

The location of each machine must be recorded in an inventory which should be checked off month by month to ensure that all additions are included in the records and that depreciations are correctly allocated

Works repairs and works extensions, as executed in the factory, will be analysed when completed to determine the charges to be made to Expenses as repairs and renewals, and to Plant Account as additions or extensions

Card Ledgers or Loose-leaf Ledgers are desirable for the above, and any fuller details that may be required can also be recorded

Depreciation is usually calculated as a percentage on the value of each asset at the commencement of each year, the rate being fixed so as to reduce the value of each machine to scrap price at the time when its working life will be exhausted Another plan preferred by some accountants is to write off yearly an equal portion of the original cost. The former has the advantage of giving a lighter charge in the later years when repairs are heavier.

Either of these methods may be applied to Machinery and Plant, the percentage on cost being distinctly preferable with machines having a short life.

PLANT AND MACHINE LEDGER

No | Purchased ____________

Description | Cost £____________

Maker | Depreciation ____________

Amount £____________

Date	Depreciation			Value			Date	Depreciation			Value		
	£	s	d	£	s	d		£	s	d	£	s	d

REPAIRS

Date	Particulars	Ref			
			£	s	d

Leasehold buildings are usually depreciated on a special plan known as the "Annuity" method. A fixed annual sum is charged as depreciation, debited to Profit and Loss Account and credited to the Leasehold Account, but this sum is fixed at such a rate as to allow interest on the diminishing balance to be debited to the Leasehold Account year by year This is to regard the leasehold as an investment and treat it as earning interest which is credited to Profit and Loss Account accordingly

Alternatively, the Sinking Fund plan is adopted by which a fixed annual sum is charged against profits and a similar amount is invested either in gilt-edged securities or in Endowment Insurance, interest on the securities should be re-invested, the fund thus accumulating at compound interest

REVALUATION It is advisable to check the depreciation calculations by valuations at intervals of a few years

TOOLS are generally maintained in working order by charging all renewals to shop expenses

PATTERNS, unless chargeable to specific orders, must be booked to a Patterns Account, and be subjected to a heavy rate of depreciation

DISCARDED PLANT should be grouped in separate records to which realized values may be credited, and any losses ascertained and written off

IDLE PLANT Advices should be instituted by means of which machines not fully used may be transferred to shops where they would be more useful, by this means the need for further purchases may be avoided to some extent

Shop Rates.

Shop Rates should be recorded in detail in a Rates Book, showing the total expenses under which the factory works, the amounts distributed as Shop Rates, and the resulting Oncost against work done

Details of the cost and how it is allocated will also be found here, as shown in the following accounts—

Dr BUILDINGS *Cr*

	£	s	d		£	s	d
Total Charges for Rents and Rates or Depreciation				Transfers to Shop Rates or General Works Rate Account			

Dr PLANT *Cr*

	£	s	d		£	s	d
Total Charges for Depreciation and Repairs				As in Buildings Account			

Dr GENERAL WORKS RATE OR SHOP RATES ACCOUNT *Cr*

	£	s	d		£	s	d
Share of Cost in respect of— Building Plant Power Heat and Light Indirect Labour				Charges made to Work done at Rates in force			

Departmental Grouping of Expenses and Output.

An essential means of linking up the financial accounts with the commercial operations is to arrange the Trading and Profit and Loss Accounts on a departmental plan, that is so as to show the trading results in respect of different products It is naturally of the greatest importance to ascertain which products are the most profitable For this purpose the works cost of the goods manufactured must be used as the debit to the Trading and Profit and Loss Accounts in each department and the Administration, Distribution and Selling Expenses must be divided between the groups of products by careful analysis

In some businesses a dissection into departments on these lines can be taken to an earlier stage and the operations in the factory can be separated in the same divisions, each distinct product having its manufacturing departments appropriated to it In such cases the ascertaining of the cost of manufacture of each group of products is immensely simplified The chief complication arises in respect of indirect expense charges on work which is done in one department for the benefit of another, and it would appear reasonable that such indirect expense should be based upon the amount of time spent on such work at a rate of expense charged upon that time (or as a percentage upon the wages it represents) in proportion to the rate of expense in the department doing the work, or the appropriate machine rates if particular classes of machines have been used

In other cases it is impossible to appropriate the manufacturing departments to specific groups of output, the different articles making up the output, although dissimilar in their final stages, use and trading markets, being manufactured in common at different stages in all the departments of the factory, and where these circumstances apply it is undesirable as it is incorrect in principle to endeavour to load the commercial expense on to the manufacturing operations Commercial operations require a different basis for their dissection and do not enter into the finished manufacturing cost of goods, which is the object of cost accounts applied to manufacturing So that the arrangement of factory oncost must not be influenced by expenses connected with the commercial side of the business, the position being really that two functions are carried on—the one a manufacturing and the other a merchanting one The manufacturing costs should arrive at the finished cost of the goods, this will be the cost on which the selling department make their calculations and this cost will be the price at which the goods come into stocktaking The records in the Cost Ledger may be made up to show either the manufactured cost or the gross cost, but the application of oncost covering the commercial charges will be clearly an application of a charge which can be correctly made only against goods which are sold and not against those which remain on hand

Costing Without Costs.

The primary object of maintaining cost records is to obtain the cost of each product, but the utility of cost records by no means ends when that has been achieved It is from the use which is made of the cost records and the manner in which the incidental information obtained by the Cost Department is utilized that the whole of the Cost System justifies itself Looked at from this point of view, the compilation of Job Costs may be considerably curtailed when the cost records are sufficiently established to enable calculations to be made upon the basis of standard or normal cost, by means of the known cost of raw material, and the calculated cost of labour for performing the required operations, the use of the costing records then becomes a criticism of shop efficiency by the comparison of output costs, the scrutiny of costs of operations, and investigation of non-effective or partly-effective assets, shown by such items as obsolete machinery, idle stocks, excessive amounts locked up in work-in-progress, etc The efficiency of the cost system must be shown by the value it becomes to the management in showing up weak points by comparison of statistics relating to these factors with standards which it is able to obtain and can show to be attainable

The frequency with which stocks of raw material are being turned over may be measured in terms of the number of months total withdrawals represented by the stock figure, the value of the work-in-progress measured in terms of the number of months completed work, the cost per unit of electricity in the power house, if producing its own current, and the Idle Time records of machines compared with Overtime Records of other machines or departments will be similarly statistical records to which the Cost Department can turn its attention. These methods used in conjunction with a debit to departments of labour, shop expenses, and spoilt material against a credit for the value of the work they perform will enable the costing of completed work to be performed upon a basis of standard or normal costs and the check upon the shop efficiency will be much more speedily obtained than where the criticism of the foreman does not come about until the job is finished and the cost worked out in detail

The valuation of work-in-progress is the one element which then presents difficulty and the difficulty is considerably increased, in fact the system may be said to be impossible where the work is non-standard With standard work valuation of work-in-progress can be assessed by taking a conservative estimate

Retail Branch Shops.

Supplies to branches are usually charged on a Selling Price basis—

(1) To facilitate checking of stock ,

(2) To prevent difficulty in branches exchanging stocks ,

(3) Because it is not always desirable to disclose cost prices

Returns from branches to Head Office then take the form of summaries of sales with cash remittances through local bank for the amount and Stock Account showing value (at Selling Price) of goods on hand

Wages and Petty Expenses should be dealt with by Imprest covering the required amount

Managers' commissions will be based on turnover

For financial stocktakings the values of actual inventories must be agreed with stock figure and reduced to cost price

Capital and Turnover.

The ratio of output to capital invested in a business may be used as a standard for comparisons at different dates—

(1) As regards capital laid out in permanent form

(2) As regards circulating capital represented by stocks, work-in-progress, book debts, cash balances less outstanding trade liabilities

(3) As regards total investment, which will include capital account, reserves, profit and loss balance, and fixed loans

CHAPTER XVI

STATISTICAL PRESENTATION OF RESULTS

IT is a commonplace assertion that statistics can be made to prove anything, and anyone who has heard two debaters arguing opposite points of view from the same figures, one alleging that there is a concealed or undetermined element of error which entirely upsets the conclusions of his opponent, will readily grasp the enormous possibilities of miscalculation which may arise in the handling of numerical records

It is clear that when figures are used for statistics—

(1) They must be accurate in themselves, or

(2) The degree of accuracy must be known,

(3) They must be prepared in appropriate classes

When used for comparisons, the sets compared must exactly agree in composition

The importance of the application of these principles in accounts lies in the settlement of tables of comparisons, whether of production, works expenses, wages in different departments, or in similar fields The accounts of a business for one period lose much of their value if they cannot be compared with previous and following records Such a comparison will be worse than useless if the accounts are not prepared on exactly similar lines year by year (or with known alterations of method or classification which are clearly shown) For instance, a book-keeper may classify catalogues in one year as printing, including such matters as company notices, another year with advertising, where the item properly belongs, or else with stationery, along with envelopes and india-rubbers Indifference to correct classification may easily upset the validity of comparison in this way, and exactly similar difficulties may arise in all compilations of numerical records

Another example may be mentioned in the booking of workmen's time, where some jobs are being done at piece rates and others at day wages It is important that the time booked to the piece work should be stated correctly If the employee is left to fill his time to his jobs at the end of the week, there is a natural tendency for him to insert such time as will ensure his earning bonus on the piece work, thus having a maximum amount of his time to be paid at day rate Production statistics prepared from these records would then be misleading, because the actual production per hour on the piece work jobs would be over-stated, and that on the day work jobs understated The introduction of time clocks to stamp the time when each job is commenced and ended will ensure accurate records all through

A similar position arises in striking averages A business man very readily assumes that if he is making 40 per cent gross profit in one department and 20 per cent in another, he will have an average gross profit of 30 per cent, and that his expenses at 25 per cent will leave him with a 5 per cent profit all round , whereas if his first department with 40 per cent profit has only half the turnover of the other one at 20 per cent profit, his average gross profit is only 26·6 per cent and his net profit 1 6 per cent

This illustration explains the distinction between an arithmetical average of numbers and a weighted average according to the quantities that the numbers represent

The arithmetical average gives a true result when the factors are correctly comparable, e g the weights of 50 similar cases set out on an invoice totalling 1,400 lb will average 28 lb per case If some of the cases are large cases and others half cases this result will not correctly interpret the circumstances. The number in each group must be obtained Assuming there are 6 large cases and 44 half-cases

Then $6 \times 1 = 6$
$14 \times \frac{1}{2} = 22$

28 cases $\quad \frac{1,400}{28} = 50$ lb per case and 25 lb per half-case

This is an example of weighted average, the differentiating weight being applied to one of the factors

Similarly, if in a factory the cost of warehousing and handling materials inclusive of storekeeping charges totals for 12 months to £2,100, and the weight of material handled amounts to 14,000 tons, the cost may be stated as 3s per ton , but if there are three classes of material, and the cost of handling is not proportionate to the weight but varies as say—

Class A—	*Class B—*	*Class C—*
2 000 tons with an expense of £10 per ton in proportion to £5 per ton of Class C	5,000 tons with an expense of £8 per ton in proportion to £5 per ton of Class C	7,000 tons with an expense of £5 per ton in proportion to £10 per ton of Class A, or £8 per ton of Class B

then the cost of handling, etc , in each case should be stated as—

A 2,000 × 10 = 20
B 5,000 × 8 = 40
C 7,000 × 5 = 35

14,000 $\quad$ 95

$$\frac{£2,100}{95 \times 1,000} = £\,022105$$

Class A— 022105 × 10 = £ 22105, say, 4/6 per ton
" *B*— 022105 × 8 = £ 1768 " 3/6 "
" *C*— 022105 × 5 = £ 1105 " 2/3 "

The application of the principle is seen in detail in framing rates of expense for the shops or departments in a factory when the expense has to be distributed equitably between them, and the rates proportioned to the work done in each

If for example the expense rates in six departments of a factory are respectively 7s 6d , 4s , 6s , 2s , 4s 3d , 1s. 9d , per hour, the oncost charged to the jobs will not be at the average rate of 4s 3d per hour as would appear by taking the arithmetical average of these figures, but must be found by taking into account the number of hours in respect of which oncost has been charged ; so that if the direct labour hours in the departments are respectively 10,000, 3,500, 15,000, 900, 10,000, and 2,000 the true result will be found by taking the weighted average and is seen to be nearly 5s 6d per hour ; the same averages may be contrasted as percentages on wages amounting to 212 per cent and 275 per cent

The average is also spoken of as an arithmetical mean, and a series of numbers at equal intervals represent an arithmetical series or progression, a feature of the series being that any two consecutive numbers differ by a common difference

In a series of numbers where the ratio of each term to the next in the series is constant a geometrical progression occurs It is illustrated in the accumulation of compound interest and other progressional increases, where the increment is in constant proportion The value of £100 at 10 per cent,

EXAMPLE (1)—

in one year is $$£100 \times \frac{110}{100}$$

in two years it will be $$\left(£100 \times \frac{110}{100}\right) \times \left(\frac{110}{100}\right) \text{ or } £100 \times \left(\frac{110}{100}\right)^2$$

so that in ten years it will be $$£100 \times \left(\frac{110}{100}\right)^{10}$$

The increase occurs in geometrical progression and the values at the end of each year form a geometrical series The total value at the end of the ten years is obtained most conveniently by the use of logarithms and is shown to be $100 \times 2\ 594 = £259$ 8s 0d

(2) Similarly, if a sum of £100 is to be paid in five years in repayment of a present loan of £50 the yearly rate of compound interest will be the ratio of the geometrical series at yearly intervals The series for the five years

is found by taking the fifth root of the ratio between the first and last terms of the series, that is $\sqrt[5]{\frac{100}{50}}$ which will give the ratio of the terms of the series, so that the rate per cent of the annual increase at compound interest is—

$$\sqrt[5]{\frac{100}{50}} \times 100 - 100$$
$$= 1\ 148 \times 100 - 100$$
$$= 14\ 8 \text{ per cent per annum}$$

(3) A Sinking Fund is required to amount to £10,000 in 10 years, the annual instalment and interest being invested at 5 per cent per annum If the yearly sum to be provided is represented by £*X*, then the summation of the geometrical progression shows that—

$$\frac{£X \times \left(\left(\frac{105}{100}\right)^{10} - 1\right)}{\frac{105}{100} - 1} = £10,000$$

$$\frac{£X \times (1\ 05^{10} - 1)}{05} = £10\ 000$$

$$£X \times (1\ 629 - 1) = £10,000 \times 05$$

$$£X = \frac{£500}{629}$$

$$= \underline{\underline{£795 \text{ nearly}}}$$

(4) It is required to find the value of a Plant costing £100,000 in 20 years if 4 per cent per annum is adopted as a yearly rate of depreciation on the diminishing value

In the series of yearly values £100,000 £100,000 $\times \frac{96}{100}$ £100,000 $\times \left(\frac{96}{100}\right)^2$, the term at the end of the 20th year will be—

$$100,000 \times \left(\frac{96}{100}\right)^{20}$$
$$= 100,000 \times 4426$$
$$= \underline{\underline{£44,260}}$$

The geometric mean of two quantities is found by taking the square root of their product The insertion of a series of geometric means between two quantities is shown in the above example (2) by the finding of the common ratio according to the number of terms required

The geometric mean is always less than the arithmetical mean for the same numbers and so may be more conveniently adopted for contrasting tables of averages where the extremes are widely divergent

Another form of variation in a series of statistical data is that of harmonic progression which occurs in the acceleration of velocity or regular variation of motion It may be illustrated by an example of a motorist, who, in travelling a distance, covers the first part of the journey at 10 miles per hour, the second part at 20 miles per hour, the third part at 30 miles per hour, and the fourth part at 40 miles per hour The average rate of travelling is not 25 miles per hour, but 19 2 miles To find the harmonic mean of 10, 20, 30, 40, forming an arithmetical progression, the harmonic scale $\frac{1}{10} + \frac{1}{20} + \frac{1}{30} + \frac{1}{40}$ is used and $\frac{1}{4}$ of this total gives $\frac{1}{19\ 2}$ So that 19 2 is the harmonic mean of the series Harmonic variation also occurs in vibrations of sound waves

Other expressions which are used in connection with the tabulation of statistical data are—

(1) The Mode is the group in a series which contains the most numerous examples It is not a specific example which is exactly determinable like an arithmetical average, but is the group as a whole into which the largest number of examples fall

(2) The Median is again not the arithmetical average but is the example in the series which occurs at the centre point midway between the two extremes It is thus different from the mode and to find it the centre point of the series must first be determined and then the

example occurring at that point must be found or estimated

In a similar way to the determination of the Median, the Quartiles are placed at points midway between the Median and the extremes of the series and are similarly found other terms in a series are referred to as variates These points are particularly useful in dealing with large numbers such as statistics of population, employment, wages, etc

In the tabulation of records dealing with the purely statistical side of a business, it is no less important to handle the figures so that they will present a correct view of affairs The same applies to curves and diagrams when used for illustration purposes These may give an exaggerated impression if faultily drawn in the setting out of the scale or in the methods adopted

It is essential that the horizontal and vertical scales should be measured in equal gradations from the start to the finish of each scale, and for the purposes of comparison it is preferable to arrange the scales so that several series can be tabulated rather than to show independent diagrams, when different scales render comparison difficult The records should progress across the diagram upwards and from left to right Where the figures to be tabulated are not in respect of equal periods in each case, the periods over which the figures are tabulated must be proportioned accordingly so that an equal period of time (e g in the case of fluctuations of business or population, etc) is represented by a similar space at any portion of the diagram

Diagrams may be drawn to represent not only fluctuations between individual groups, but to show the cumulative effect of fluctuations as the period progresses, or the object of the diagram may be to show the trend of the statistics, and in that event a better presentation is made by averaging several periods to obtain each point on the diagram and a smoother curve results

Another very common source of error is the readiness with which many business men accept "special tests" of work done as a safe basis for calculating results So many factors enter into the problem in a case like the making of a special test of work in a factory, that even if frequently done, these will often be entirely unreliable owing to the prevalence, at the time, of necessarily unrepresentative conditions not applying to the factory as a whole, for example, in respect of such matters as time lost between jobs, time fixing or preparing machines, occasional faulty material and other similar causes Thus, it is essential, in building up an approximation of the whole from a few selected factors, to have all the conditions fairly represented in the factors, any faults being magnified in proportion to the degree to which the conclusion is expanded

Weekly Summary

In most businesses a weekly summary is found useful showing—

(*a*) Sales in each department for the week and the corresponding week of the previous year,

(*b*) Total sales for the quarter to date, with similar comparisons of previous years,

(*c*) Statistics of *quantities* in detail of each product turned out, where these can be produced,

(*d*) Departmental cost and profit summaries, if obtainable, week by week,

(*e*) Statement of Sundry Book Debts, showing in an aggregate account the balance at the commencement of the week, sales debited for the week, cash and discounts and other credits for the week and aggregate balance,

(*f*) Similar statements of Bank Account and Sundry Creditors,

(*g*) Accruing liabilities

WEEKLY SUMMARY

For Week Ending________________

	Sales for Week	Sales last Week	Total Sales for Quarter	Correspond-ing Week last Year	Total for same Quarter last Year	Output and Gross Profit from Cost Records £	s	d
Net Sales—								
Dept A =								
„ B =								
„ C =								
„ D =								
Increase =								
Decrease =								

Sales Ledger—
Balance at commencement of week =
Add Sales (Net) =
Less Cash Received and Discounts =
Total Book Debts =

Bank Account—
Balance forward =
Deposits =
Cheques Drawn =

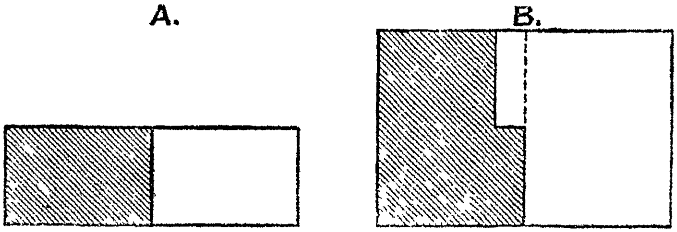
Purchase Ledger—
Balance forward =
Purchases =
Payments

Accounts for payment and Bills due

Use of Diagrams.

Diagrams should be made use of to emphasize—

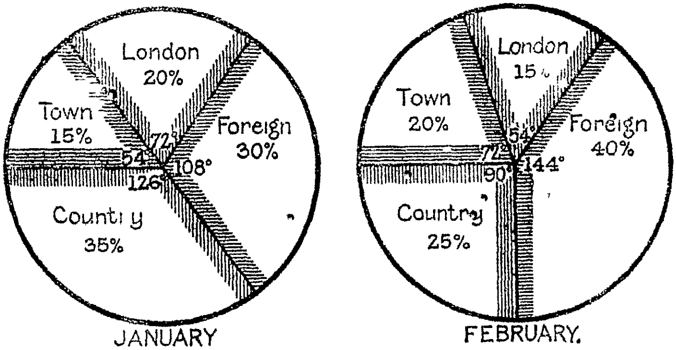
(1) Comparisons between groups, e g Areas proportioned to Population and shaded to show Trade done



COMPARISONS OF TWO AREAS CANVASSED BY SALESMEN

A Having Population, 50,000, Weekly Sales Value, £1,000; £2 per 100 Population
B Having Population, 100,000, Weekly Sales Value, £1,800, £1 16s per 100 Population

(2) The composition of a group or similar groups, e g Character and Proportion of Trade done in an Area comparing different Periods

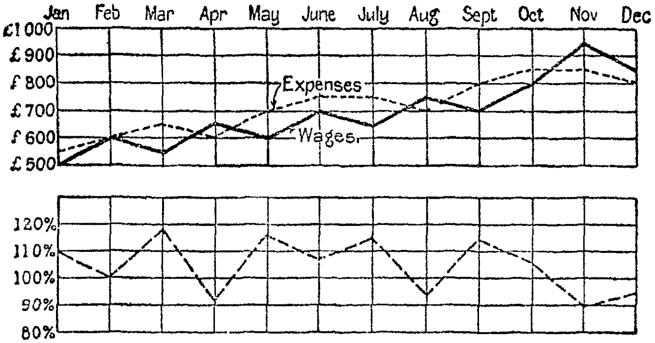


PER £100 SALES

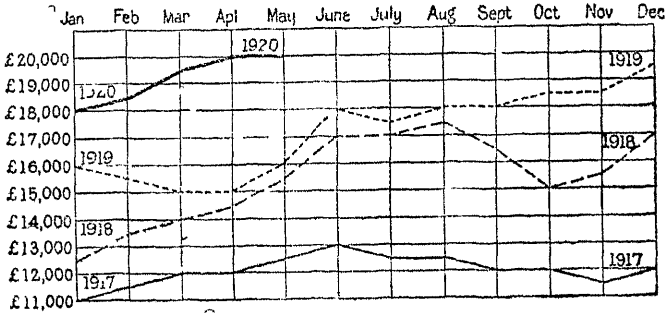
Diagram showing composition of Trade done in January and February

(3) The variations in a series of similar records at successive dates, e g Wages and Expenses, with Expense fluctuations expressed as percentage on Wages

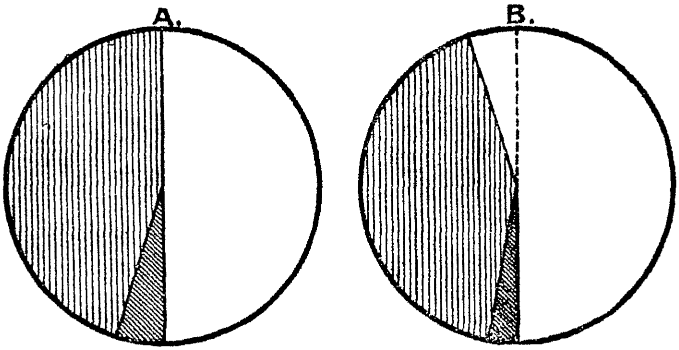
	Jan	Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec.
	£	£	£	£	£	£	£	£	£	£	£	£
Wages	500	600	550	650	600	700	650	750	700	800	950	850
Expenses	550	600	650	600	700	750	750	700	800	850	850	800
Percentage	110	100	118	92	116	107	115	93	114	106	89	94



(4) The variations between two or more series, e g Sales during different periods



(5) Comparisons in three relations which can be combined geometrically, e g Sales per traveller per 1,000 population in different areas



Comparison of Two Areas Canvassed by Salesmen to Show Sales per Traveller per 1,000 Population

A Population, 50,000; Sales, £1,000, Travellers, 10; Sales per Traveller, £100

B Population, 100,000, Sales, £1,800, Travellers, 15; Sales per Traveller, £120

A Sales per 1,000 Population, £20; Sales per Traveller per 1,000, £2

B Sales per 1,000 Population £18; Sales per Traveller per 1,000, £1 4s

CHAPTER XVII

EXAMINATION QUESTIONS

Institute of Chartered Accountants

(1) WHEN closing the accounts of a manufacturing business how should the value of "work-in-progress" be arrived at? Briefly describe a type of business with which you are familiar and state how the value of this asset is ascertained When the valuation has been made how would you require it to be dealt with in the accounts you are asked to audit?

(2) From the following information prepare Pig Iron Production Account showing the cost per ton of each class of expenditure and of the pig iron produced—

Sundry Stores on hand 1st July, 1925—Coal, £4,720, Coke, £3,580, Limestone, £1,450, Ironstone, £3,930, Sundries, £2,700

Purchased during the year—Coal, £21,880, Coke, £29,470 Limestone, £5,030, Ironstone, £18,690, Sundries, £7,810

Sales of Slag, £10,000, General Works Charges, £4,400, Wages, £17,600, Production of Pig Iron, 32,000 tons

Stocks on hand June, 1926—Coal, £3,800, Coke, £2,650, Limestone, £1,730; Ironstone, £3 426, Sundries, £2,910

(3) Show an account for distributing power, light, and heat expenses, indicating the items affecting this account, and discuss the basis of allocation (1) of the total charge over the departments, (2) of the departmental charges over the costing units

(4) Draw up a system of Cost Accounts for a building contractor and show how they would be co-ordinated with the financial accounts of the business.

(5) You are asked to consider and report upon the costing system employed by a manufacturer of cycle accessories, more particularly as to whether the interest upon capital and loans should be taken into account in arriving at costing results

Report briefly upon the latter point

(6) A pencil manufacturer makes two types of pencils " Black " and " Coloured " They undergo two processes, factory and finishing Raw materials used in the factory and general expenses are apportioned in the ratio of output of each class , the output in 1926 was 24,000 gross Black and 8,400 gross Coloured , the actual cost of labour for each process is ascertained , " other charges " for each processes are apportioned in the same ratio as labour for that process , finishing materials are apportioned in the ratio of finishing labour From the following particulars prepare a statement of the cost per gross, in shillings and pence of each item and each process in the cost of manufacture , and the profit per gross if the selling prices are £1 and 19s respectively

	£
Factory Raw Materials, Opening Stock .	3,680
,, ,, Purchases	10,710
,, ,, ,, Closing Stock	4,940
,, Wages, Black	4,200
,, ,, Coloured .	1,365
,, Charges	3,710
Finishing Wages, Black	2,000
,, ,, Coloured .	560
,, Raw Materials, Opening Stock	720
,, ,, ,, Purchases	3,370
,, ,, ,, Closing Stock . .	890
Charges	1,920
General Expenses .	3,645

(7) A, who commenced business on 1st July, 1925, as a piano manufacturer places before you the following information and asks you to prepare a statement showing the profit per piano sold (charging labour and material at actual cost, works oncost at 100 per cent on labour and office oncost at 25 per cent on works cost), and statement showing a reconciliation between the profit, as shown by the Cost Account and the profit as shown by the Profit and Loss Account for the year ended 30th June, 1926

Two grades of pianos are manufactured and are known as No 1 and No 2 There were no pianos in stock or in course of manufacture on 30th June, 1926

		£
Average Cost of Materials, per Piano No 1		10
" " " " No 2		8
" " of Labour " No 1		19
" " " " No 2		14
Finished Pianos Sold, No 1	118	
" " " No 2	205	
Sale Price of Pianos, No 1		75
" " " No 2		55
The Works Expenses were		5,240
The Office Expenses were		3,166

You are required to prepare the necessary statements, showing the actual profit for the year

(8) The Paper Products Company, Ltd, owns—

A paper mill, all the output of which is sold to the factory at 10 per cent above mill cost price

The factory which sells all its output to the selling department at 10 per cent above factory cost price

The selling department

From the following figures calculate (*a*) the factory cost of output, showing the proportion "paper" bears to "other goods, wages and charges", (*b*) the profit made by the company in the year, allowing for (*c*) the reserve required to eliminate the unrealized profit on increase in stocks in the year, assuming that the selling department increase is in the same proportions as in (*a*)

	£
FACTORY—	
Opening Stock on Hand, Paper	18,700
" " " Other Goods	14,800
Paper Purchases from Mill	73,300
Other Goods, Wages, Charges, etc	43,900
Closing Stocks on Hand, Paper	24,200
" " " Other Goods	13,500
SELLING DEPARTMENT—	
Opening Stocks on Hand	27,400
Sales	148,000
Wages, Charges, etc	16,400
Closing Stocks on Hand	37,300

(9) What are the principles of Process Cost Accounts? Illustrate your answer by means of *pro forma* accounts of a manufacturing business to which Process Cost Accounts could apply with advantage

(10) From the point of view of Cost Accounts discuss and compare the practice of paying wages—

(*a*) On the piece-work system ,
(*b*) On the day-work basis ,
(*c*) On the bonus or premium system

(11) Submit a *pro forma* Manufacturing Account of any business with which you are familiar, drafted to facilitate the ascertainment of—

(*a*) Prime cost ,
(*b*) Factory cost , and
(*c*) Office Oncost

(12) Explain the circumstances in which the following alternative methods of allocating oncost are suitable—

1 Percentage on direct wages
2 Rate per hour on direct time
3 Rate per hour on machine time
4 Rate per hour on machine time to cover machine expenses, and rate per hour on direct time for other expenses
5 Rate per unit of output
6 Rate per cent on prime cost

(13) You are Auditor to a Limited Company which manufactures and repairs motor cycles The directors have instructed you to extend your audit to the costing records

Upon attending at the Stores Department you find—

(*a*) That invoices representing goods purchased are handed to the storekeeper when the goods arrive

(*b*) That particulars of goods received and issued are entered by the storekeeper in a " Stores Book," no other record being kept

(*c*) That stores are issued to foremen upon verbal request

(*d*) That the storekeeper is allowed to order goods direct if under £10 in value

(*e*) That stores " left over " from jobs are replaced in the store-room bins by the foreman concerned

If you do not approve of the system of store keeping described above, make suggestions for its improvement

(14) A Company carrying out large contracts, kept separate accounts for each Contract in its Contract Ledger This Ledger showed the following expenditure in connection with Contract No B497, as on 31st July, 1926

Materials Purchased	£47,952
,, from Store	8,674
Plant from other Contracts	12,520
,, Purchased	3,619
Wages	63,524
Direct Expenses	1,915
Proportion of Establishment Charges	7,619
	£145,823

The Contract, which was commenced on 1st February, 1926, was for £295,000, and cash had been received amounting to £110,950, which was the full amount certified, less 20 per cent retention money The work was certified to 31st July, 1926, when it was half completed, and materials on the site were valued at £8,747

A Contracting Plant Ledger was kept in which depreciation was dealt with monthly, the total amount of which was £1,419 in respect of Plant on Contract No B497

You are required to prepare an account showing the profit, if any, to date, and to state what amount should, in your opinion, be taken into consideration in the Company's accounts for the year to 31st July, 1926

(15) Prepare a Wagon Revenue Account for a concern, comprising a colliery and brickworks, which owns railway wagons, used—

(*a*) To carry coal from the colliery to customers
(*b*) To carry bricks from the brickworks to customers
(*c*) To carry coal from the colliery to the brickworks
(*d*) To carry bricks from the brickworks to the colliery

(16) A Limited Company owns and works deposits of clay and coal The clay is used in the manufacture of clay ware and earthenware, and the coal required for firing

kilns is obtained from the Company's Colliery Surplus coal is disposed of in trading

It is important that the results of Colliery and Clayware Departments be distinguished

Discuss the principles governing the fixing of the price of coal used in the Clayware Department

(17) In return for a wayleave granted by B Co , A & Co , Ltd , which company pumps water (with an electrically driven pump) and generates electricity for its own requirements, agrees to supply the B Co with water and electricity at cost price, the cost to be certified by you as Auditor of A & Co , Ltd

The water and electricity are metered and you find—

1 That the cost of pumping, other than electricity consumed, amounted to £250

2 That the cost of electricity, other than water consumed, amounted to £4,950

3 That the water pumped had been distributed as follows (*a*) To the B Co , one-fifth , (*b*) To the Electrical Works of A & Co , Ltd , three-fifths , (*c*) To other departments of A & Co , Ltd , one-fifth

4 That 500,000 units of electricity had been generated and used as follows (*a*) By the B Co , 100,000 units , (*b*) By the Water Pump, 100,000 units , (*c*) By the Electrical Works of A & Co , Ltd , 100,000 units , (*d*) By other departments of A & Co , Ltd , 200,000 units

Prepare accounts showing the cost of water and electricity respectively, and the charges to be made for each, to each consumer

Society of Incorporated Accountants and Auditors

(18) Do you consider it advisable that there should be agreement between the financial and costing records of a business ? Give reasons for your answer, and explain what alterations would be necessary to the financial records of purchases and wages in order to effect agreement

(19) You are required to select a manufactured article with which you are familiar, and—

1 To frame a cost sheet giving the details which enter into the cost of production

2 To explain the basis upon which the oncost expenses have been apportioned

3 To describe the audit you would conduct when checking the cost sheet

(20) What steps should be taken to provide a continuous check on the Stores and the Storekeeper

(21) How far, and in what manner, do standard costs become a factor in the management and control of a manufacturing company ?

(22) Works A and Works B are under one control, and manufacture one commodity It is desired to ascertain the comparative cost of manufacture at each works Describe the steps you would take in order to carry this out

(23) A client who has four different manufacturing departments, A, B, C and D, containing 12, 10, 8 and 6 machines respectively, asks for your advice in assisting him to arrive at a basis of costing The machines, though uniform in each department, differ in size and capacity

From his last year's Trading Account you extract the following information—

	£
Productive Wages	20,000
Material Used	15,000
Expenses	15,000
	£50,000

The expenses consist of the following items—

Rent and Rates	2,500
Power	1,500
Light and Heat	250
Repairs and Renewals	750
Insurance	500
Interest on Capital	2,500
Depreciation	2,000
Salaries	2,000
Non-Productive Wages	1,000
General Expenses	1,500
Discounts	500

Your investigation shows that the first seven items of expense, amounting to £10,000, should be charged direct to the departments in the following proportions A, 50 per cent, B, 25 per cent, C, 12½ per cent, D, 12½ per cent The remaining four items, amounting to £5,000, should be treated as indirect expenses, and should be charged to the departments as follows A, 35 per cent, B, 35 per cent, C, 15 per cent, D, 15 per cent

The wages of the departments were A, £7,000, B, £6,000, C, £4,000, D, £3,000, and the materials used in the departments were A, £5,000, B, £5,000, C, £4,000, D, £1,000

Find the total cost of production of each department and the hourly rate of expense of each machine, reckoning 44 hours per week and 50 working weeks to the year

(24) Make a suggestion for dealing with the depreciation of a plant, which, costing £1,000, has an efficient life of ten years, and then has a scrap value of £200, and give arguments for and against the adoption of the various methods

(25) What are the principal methods of estimating and distributing overhead expenses in costing accounts? To what special type of industry would each system be most appropriate?

(26) Devise stock keeping systems for the following concerns—

(*a*) A pianoforte dealer, (*c*) A brass founder, and
(*b*) A general draper, (*d*) A general merchant

What do you know of continuous methods of calculating stock?

(27) Give draft of statistical information which should be kept by a large stores with, say, 100 departments, and for what reasons would you refer to such statistics for audit purposes?

(28) (*a*) What tests can be applied so as to ensure the accuracy of Cost Accounts?

(*b*) What steps would you take as Auditor to check the accuracy of calculations arrived at through the costing accounts

(29) Explain the procedure of continuous stocktaking and its advantages over an annual stocktaking

(30) How would you satisfy yourself that the amounts appearing under the head of Materials and Stores allocated to "Works Repairs" and "Standing Orders" were substantially correct?

(31) (*a*) Write a careful account showing how wages are dealt with in costing systems, specially dealing with cases of varying efficiency and abnormally-employed labour, where some men are employed on piece-work and some on fixed wages What part will the superintendence of labour play in your system of costing?

(*b*) State the methods you would apply to secure the proper allocation and charge of day and night piece work labour costs to articles of production

(32) You are instructed to report on the accounts of a large bakery establishment for the purpose of ascertaining the cost of production of bread With a view to the comparison of results you are instructed to base your calculations on the cost of production of a quartern (4 lb) loaf You find that your clients do not make quartern loaves but only 1 lb and 2 lb loaves in the proportions of 3 to 2, and that the actual weight of dough required to make a 1 lb loaf is 1 25 lb, and a 4 lb loaf 4 50 lb What recommendations do you make in order to render your report of value for statistical comparison? In your answer you may assume that the total weight of the dough produced is 1,521,000 lb

(33) Draw up a *pro forma* trading account suitable for any *one* of the following businesses, namely (*a*) woollen manufacturer, (*b*) printer, (*c*) steel manufacturer, marshalling the items in such a manner as to adapt them for the purpose of ascertaining (i) prime cost, (ii) factory oncost or overhead charges, (iii) administrative charges, and (iv) selling expenses

(34) In many cases it is difficult to locate accurately cost of production to definite articles or products, as for example (*a*) Production from a slate or stone quarry, where various grades and qualities of slates or stones are obtained from one mass or block, the grades being sold at varying rates according to the size and quality, (*b*) Gas, coke, tar, and ammoniacal liquor from carbonized coal State what particulars would guide you in allocating the cost of production in the two cases named Should by-products be charged with any portion of the material costs or costs of production ?

(35) A biscuit manufacturing firm only estimates the cost of production of the articles manufactured by it, and does not attempt in any way to verify their accuracy by balancing the estimated costs of production of all articles with its general trading accounts You are requested to examine a detailed cost sheet of this firm of a specified biscuit and to state whether in your opinion the estimated costs are approximately accurate or otherwise Point out the methods you would adopt in verifying the costs submitted, and the basis on which you would suggest the "factory oncost" should be applied

(36) How would you ascertain whether the total oncost or overhead factory charges of a factory for a given period, had been properly and fully absorbed in the costs of production for that period ? Would you object—as an auditor—to the addition of a percentage of factory oncost to the work-in-progress at date of making up the annual accounts ?

London Association of Accountants

(37) What is the difference between—
1 Prime Cost,
2 Cost of Production ?

(38) Define—
1 Output or Single Cost Accounts,
2 Working Cost Accounts,
3 Departmental Cost Accounts,

4 Multiple Cost Accounts,

5 Process Cost Accounts

(39) The following is the Trading Account of a manufacturer from which you are desired to ascertain (*a*) the cost of materials used, (*b*) the value of the output of manufactured goods

Dr TRADING ACCOUNT *Cr*

	£	£		£	£
To Stock—			By Sales		52,500
Finished Goods	5 000		,, Stock—		
Raw Material	1,500		Finished Goods	4,375	
		6,500	Raw Materials	1,750	
Purchases		15,000			6,125
,, Wages		25,000			
,, Carriage		1,250			
,, Gross Profit		10 875			
		£58,625			£58,625

(40) The following account appears in the Impersonal Ledger of a firm of contractors What is the object of this account, and what does it represent ?

COST BOOK ACCOUNT

1926		£	1926		£
Jan 1	To Balance	2,000	Dec. 31	By Contracts and Charges	35,000
Dec. 31	,, Materials from Stock	16,000		,, Materials returned to Stock	1,400
	,, Wages	12,000		,, Balance carried down	2,600
	,, Sundries—Cash Payments	100			
	,, Profit and Loss Account	8,900			
		£39 000			£39 000

(41) Into how many classes may Factory Cost Accounts be divided ? State the objects of each class.

(42) (*a*) Into how many classes may indirect expenses—or oncost—be divided ?

(*b*) Give examples of expenditure of each class

(*c*) What are the two principal methods by which oncost may be allocated over various contracts ?

(43) (*a*) From the following details taken from the books of an iron company, prepare an account showing the cost of the pig iron manufactured during the year ended 31st December, 1926.

	Stock at 1st Jan 1926	*Stock at 31st Dec*, 1926
	£	£
Limestone	300	135
Coal and Coke	2,400	1,700
Iron Ore	1,400	1,690
Purchases—		
Limestone	4,000	
Coal and Coke	39,000	
Iron Ore	17 000	
Wages	16 000	
Carriage Inwards	2,100	
Repairs, Renewals and Depreciation	4 200	
Output	50,000 tons	

(*b*) What was the gross profit on sales of pig iron during the year? The stock at 1st January was £40,000 and at 31st December, £27,500, the sales being £135,000

(44) The following particulars relate to the year ended 30th September, 1926, and are from the books of a malleable ironfounder, making only small castings The sales amounted to £28,000

	£
Stock of Finished and Partly Finished Goods at 1st October 1925	618
Stock of Finished Goods and Partly Finished Goods at 30th September 1926	480
The Net Manufacturing Cost amounted to	19,700
Finishing Goods & Warehouse Salaries and Packing Materials amounted to	1,418
The total of the Distribution and General Expenses was	2 660

(*a*) State the gross profit and the percentage to sales,

(*b*) State the net profit and the percentage to sales,

(*c*) According to these figures what percentage should be added to manufacturing cost to cover warehouse oncost?

(*d*) And what percentage should be added to that result to cover general and distribution expenses?

Institute of Cost and Works Accountants

(45) Give your views as to the respective merits of a perpetual inventory system and physical stocktaking, and state when and for what purposes either of these can be relied upon without resorting to the other Under what conditions would you consider an interim physical stocktaking necessary?

(46) How would you deal with the cost of patterns in your cost accounts ?

(47) Describe a system of control and records for use in connection with coal or slack in an industry which consumes it in large quantities

(48) Formulate a system in outline by means of which the cost of production of by-products could be ascertained

(49) From the following figures draft a form of Weekly Cost Sheet for a foundry—

Production 330 cwts good castings

	£	s	d
Sand	3	–	–
Limestone	57	–	–
Sundry Stores	15	–	–
Coal	94	4	–
Pig Iron	276	–	–
Scrap	51	–	–
Wages Direct	120	–	–
Rent and Rate	47	8	–
Other Expenses	17	8	–
Wages Indirect —			
Corenakers	24	–	–
Foreman	30	–	–
Dressers	30	–	–
Other Wages	27	–	–
	£792	–	–

(50) A firm of engineers are desirous of tendering for the erection of a suspension bridge From the following estimated figures prepare a statement showing the total cost, and also the sum which they can quote in order to obtain a net profit of approximately 9 per cent Total cost of materials required £5,000, labour £3 per ton on 600 tons, carriage freight, and insurance, 600 tons at 25s per ton, erection £2 5s per ton, use of erector's plant and tools, £200, travelling expenses £450 Works expenses 50 per cent on labour, establishment and general expenses 20 per cent on labour

(51) Describe a method for controlling minimum and maximum stocks of raw materials

(52) Describe a method that will enable you to automatically ascertain, at the end of each month, the values

of "materials and work-in-progress" Show the accounts used and make the final entries necessary for balance sheet purposes

(53) The following statement of expenses is taken from the books of a manufacturing company Divide the Establishment Expenses under the following headings, stating the method upon which you would base your rates and reasons for so doing—

(*a*) Machine Rate
(*b*) General Works
(*c*) Sales and Distribution
(*d*) Administrative and Financial

Rent, Rates, and Taxes	£1,000
Repairs and Maintenance (Plant and Machinery)	596
,, ,, (Buildings)	482
Fuel	540
Gas and Water	195
Electrical Power	811
Materials used	102,418
Maintenance of Patterns	618
Wages	48,017
General Shop Supplies	311
Interest on Loans	281
Storekeeping	225
Bad Debts	176
Works Management	323
Depreciation (Buildings)	1,640
Foremen, Labourers, Timekeeping, etc	1,418
Depreciation (Plant and Machinery)	3,000
Carriage Inwards	257
,, Outwards	530
Commissions	195
Drawing Office and Supplies	786
Travelling Expenses	462
Designing and Estimating	578
General Expenses	430
Management and Secretarial	950
Advertising and Literature	250
General Office	776
Stationery	87
Rates, Taxes, and Insurance (Office Property)	430
Branch Expenses	1,278
Sales	173,510
Productive Hours worked	397,500 hours

VALUE OF WORK IN PROGRESS—

At Commencement of Period			*At End of Period*		
Labour	Mtls	Estab't Exps	Labour	Mtls	Estab't Exps
£14,701	£11,068	£13,408	£13,041	£9,017	£12,101

(54) Explain very fully the following—

(*a*) Should Interest on the Capital Outlay in Plant and Machinery be included in Establishment Expenses ?

(*b*) If so, under which heading (in question 53) would you include this item and why ? If not, give your reasons

(55) Give details of a method of arriving at a " Machine Rate " and in particular how you would incorporate the undermentioned items of expenditure in such rate—

(*a*) Depreciation of Buildings
(*b*) Cost of Power
(*c*) Small Tools
(*d*) Shop Supervision Wages

also state how you would apply the rate so arrived at, to your cost accounts

(56) On completion of a Reconciliation Statement of Factory Expenses and Oncost at the end of the Accounting Period it is found that the total charges for Factory Expenses or Oncost have not been completely absorbed in the Cost Accounts State how you would deal with the balance in question

(57) In the majority of factories where small parts, such as bolts, nuts, screws, etc , are consumed in great quantities over a period of, say, 12 months, also certain standard raw materials are usually charged in " costs " by weight, the purchase price for these items will vary greatly during this long period Describe any special method you consider will be necessary to ascertain and regulate the price at which the above items should be charged in your cost accounts in order to obviate any great difference when comparing the total value of stocks on hand as against stores purchased and issued

(58) In a factory working departmentally and manufacturing its own tools (and using same) would you consider that to make tools is productive or otherwise ? State reason and point of view

(59) State how you would deal with each of the following items in your cost accounts and which items you would—

(*a*) Include in your Establishment Expenses or "Oncost"

(*b*) Charge to Capital

(*c*) Charge to Revenue

Give reasons for your answers

1 Expenses of Welfare Department
2 Employers' Liability Insurance
3 Experimental Expenses
4 Carriage inwards
5 Renewals to loose plant and tools
6 Debenture Redemption Fund
7 Patents Expenses
8 Waiting and Idle Time
9 Share Transfer Fees
10 Fire Insurance Premiums
11 Bad Debts and Bad Debts Reserve
12 Insurance—Old Age Pensions

(60) Draft a final cost summary sheet for use in connection with the management of mechanically propelled transport vehicles, and explain how you would obtain all the information required therefor What checks would you employ to prevent wrong information being returned ?

(61) How would you proceed to provide for the continuous measurement of labour efficiency in a factory with which you are acquainted ?

(62) In the generation of electrical energy there are three distinct processes (*a*) Coal transport and handling, (*b*) Steam generation, and (*c*) Utilization of steam in the production of the electrical energy

Part of the electrical energy which is finally produced is consumed (in unequal and varying amounts) in each of these three processes, so that the ultimate net output is the total amount generated less that used in the three processes State the method you would adopt in order to show the true cost of each process having regard to these facts Prove your answer with assumed figures

(63) At the end of the financial year there is a discrepancy

of 11 per cent between your Raw Material Control Account balance and the totals (proved correct as far as addition is concerned) of the balances of your Material Ledger Cards You are instructed to investigate the accounts State how you would proceed and enumerate all the possible causes of the discrepancy

(64) In some cases workers are engaged upon an operation in which they deal with various types of product, it not being practicable to determine the actual time spent in connection with each How would you proceed to obtain reliable labour costs in such a case ?

(65) How would you treat overtime pay in arriving at the labour cost of a job or article ?

(66) Owing to trade conditions, a department of a factory is working to 40 per cent of its normal capacity State how you would propose to deal with the standing expenses of that department when costing its products

(67) In most industries where order costing is applied, there is to be found one class of operation or one department in which the methods of allocation of time and material as applied to the rest of the factory cannot be employed Examples are the electro-plating department of a general engineering works, the ammonia stove of a waterproof garment factory, the steaming chamber of a dye house, the baking oven of a biscuit factory Describe how you would calculate and distribute the cost of running one of these departments, or of a similar department, of which you have first-hand knowledge Criticize the value of your method

(68) The labour employed on certain operations in engineering shops, e g welding, hardening, enamelling, etc , is often of such small dimensions as to make it impracticable to charge it direct to Job Orders What is your recommendation for dealing with such charges ?

(69) Having determined maximum and minimum stocks in a large store, what is the machinery which should be used to ensure its automatic operation ?

(70) It is decided to distribute works oncost by means of two separate rates, one on direct labour and one on direct materials In arriving at these rates state how you would allocate the various Oncost expenses between these two sections

(71) Do you consider it essential that the whole of the general or overhead expenses should be absorbed in production cost regardless of the volume of production during the period concerned ?

(72) A firm has two plants manufacturing the same product, and decides to close down one of these plants and transfer the production to the other Outline the features you would expect to make in a report on the probable saving in cost of production consequent on the proposed step

(73) A firm produces toy engines and motor-cars which are stamped out of tin plates, assembled and sometimes painted, and desires to ascertain its profit and loss to date on each running contract As it is their busy season, they cannot stop work for a physical stocktaking Is it possible to obtain the required information ? If so, explain exactly how they should proceed to get it

(74) A factory with seven departments puts in hand a large internal repair job, utilizing most of the departments' labour, and finally the job is fixed in one of the departments with its own labour How should this be dealt with in the accounts ?

(75) Assuming a grant of £10,000 to have been made for new constructions to be carried out by a firm's own staff , that on completion the cost was found to be £12,000, due in part to the lack of proper equipment, and that the work could have been contracted for outside at £8,000 What, in your opinion is the figure which should be added to the Capital Account ?

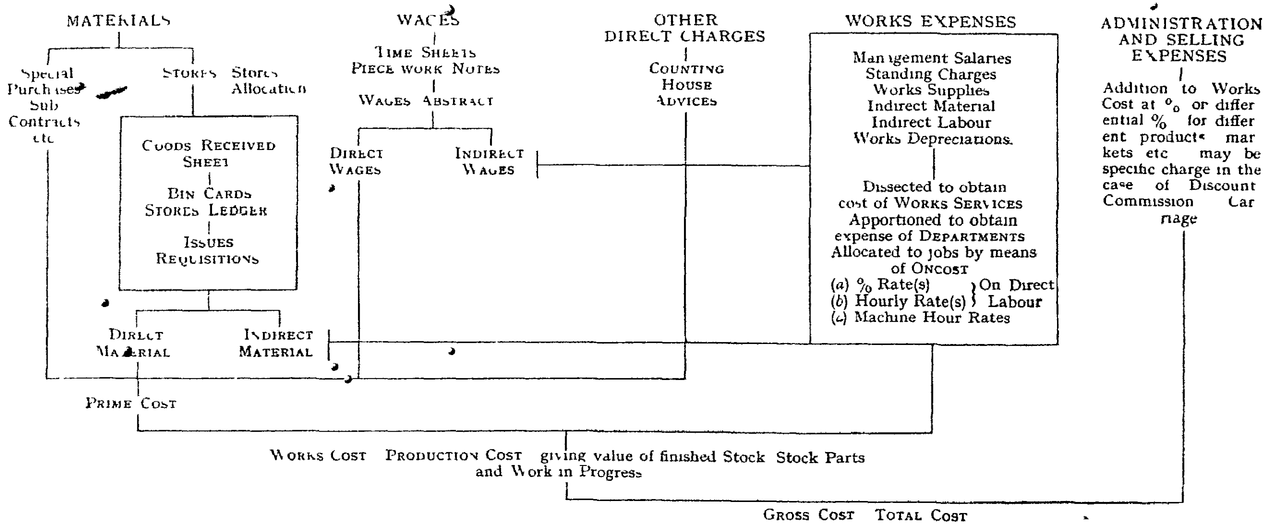
APPENDIX

MODEL FORMS

PRACTICAL COSTING ROUTINE

(*Suitable for an Engineering Works*)

Costs are obtained of every Part and Summaries of Costs for every Machine Works orders are issued for batches of parts for complete machines built up from stock parts and special fittings and for repair work Expenses are recorded under Factory Expense Standing Order Numbers against the shop responsible



QUANTITY SHEET

Pro No *PA 7A*
Quantity Sheet No 12
Data Sheet No
Date of Issue *7th May*, 19--

Purchaser *Messrs Brown & Co*,
Description of Order *One* 20,500 *K V A* (18,000 *K W*) *Turbo Alternator*
Delivery Date 20*th Dec*, 19—

Drawing Number	Part	Number		Pro No Description and Remarks	Mat l	Test	Routing	Supplied from	Plan Compl Dates			Date Issued
		Set	Total						Dept	Start	Finish	
L 1110/103 *A*	7	12	12	*Field Coils Req d 12 lengths, each 360 ft long, of soft double annealed H C Copper Strip, 1 50 in × 220 in bare with semi-circular edges*	*Cpr*		23	*Req* 326				
L 1180 *M* 102 *A*	3	60	60	*Springs Req d 60 ft of ¼ in × 045 in Spring, Phosphor Bronze*	*Ph B*		7	*Stock*				
P 2611 *M* 15	—	2	4	*Caps (Pinion End) Patt* 6 *M*, 39 *C*	*C S*		4	*Req* 326				

EXTRACT FROM MATERIAL SPECIFICATION (QUANTITY SHEET)

REQUISITION

Purchaser *Messrs Brown & Co*
Description of Order *One* 20,500 *K V A* (18,000 *K W*) *Turbo Alternator*
Delivery Date Required 15*th June*, 19—

P O No *PA 7A*
Requisition No 326
Date of Issue to Order Dept 14/5/—

Drawing Number	Part No	Number		Mat l	Description and Remarks	For Dept	Ordered from	Order No	Date of Order	Promised Delivery Date
		Set	Total							
L 1110/103 *A*	7	12	12	*C pr*	*12 lengths each 360 feet long, of soft double annealed H C Copper Strip, 1 50 in × 220 in bare, with semi circular edges*	23	*Smith & Co*	*P E* 1493	16/5/—	*Start 1st June and complete by 10th June*
P 2011 *M* 15	—	2	4	*C S*	*Caps (Pinion End), Patt 6 M 39 C*	4	*Davies & Co*	*P E* 1497	16/5/—	*Four weeks after receipt of order*
					Signed____*F W* ______________					

PURCHASE REQUISITION
(Material special to order)

Goods Received on 18th *July*, 19—
From *Messrs Davies & Co*
Order No *PE* 1497

No 1793
Per *L M S Goods*
Pro. No *PA 7A*

Drawing	Part	Pattern	Description	Qty	Weight				Rate	Value		
					T	C	Q	lbs				
P 2011, *M* 15	—	6 *M*, 39 *C*	*Cast Steel Pinion End Caps*	4			1	12	56/- *cwt*	*£*1	-	-

Received by *T R* | Inspected by *A B* | Received in Shop *W W*

MATERIAL (SPECIAL) RECEIVED IN SHOP
(Similar advice (differently tinted paper) used for material received in Stores)

GOODS RETURNED ON 20th July, 19—
To Messrs Davies & Co
Order No PE 1497

No 184
Per L M S Goods
Pro No PA 7A

Drawing	Part	Pattern	DESCRIPTION	Qty	Weight				Rate	Value		
					T	C	Q	lbs				
P 2011, M 15	—	6 M, 39 C	Defective Cast Steel Pinion End Cap	1				10	56/- cwt	£	5	-

Received at Despatch F E

Reason for Rejection Wrong Size

MATERIAL RETURNED TO SUPPLIER

PURCHASE REQUISITION

for *Stock* Date *7th May,* 19—

Account No *C I/403*

Quantity	DESCRIPTION	Purchase Order	Supplier	Purchase Notes
100 *feet*	*¾ in × 045 in Spring Phosphor Bronze*	*P E 1287*	*Dunn & Co*	

Submitted by ______*R E*______________________

Approved by ______*J K*______________________

PURCHASE REQUISITION
(Stock Material)

STOCK MATERIAL REQUISITIONS

Pro No *PA 7A*

Contract *Messrs Brown & Co*

Date *27th June, 19—*

Drawing No	Part	Q S No	Quantity	DESCRIPTION	Stores Folio	T	C	Q	lbs	Rate	£	s	d
L 1180 *M* 1024	3	12	60 *feet*	¾ *in* × 045 *in* *Spring Phosphor Bronze*	7				7½	1/6 *lb*		11	3

Foreman *B B*	Shop 7	Approved *K*	Issued by *E F*	Posted by *T R*	Date 28/6/2–	Entered by *M*	Entered on Costs by *W W*

STORES REQUISITION

STOCK MATERIAL RETURNS

Pro No *PA 7A*

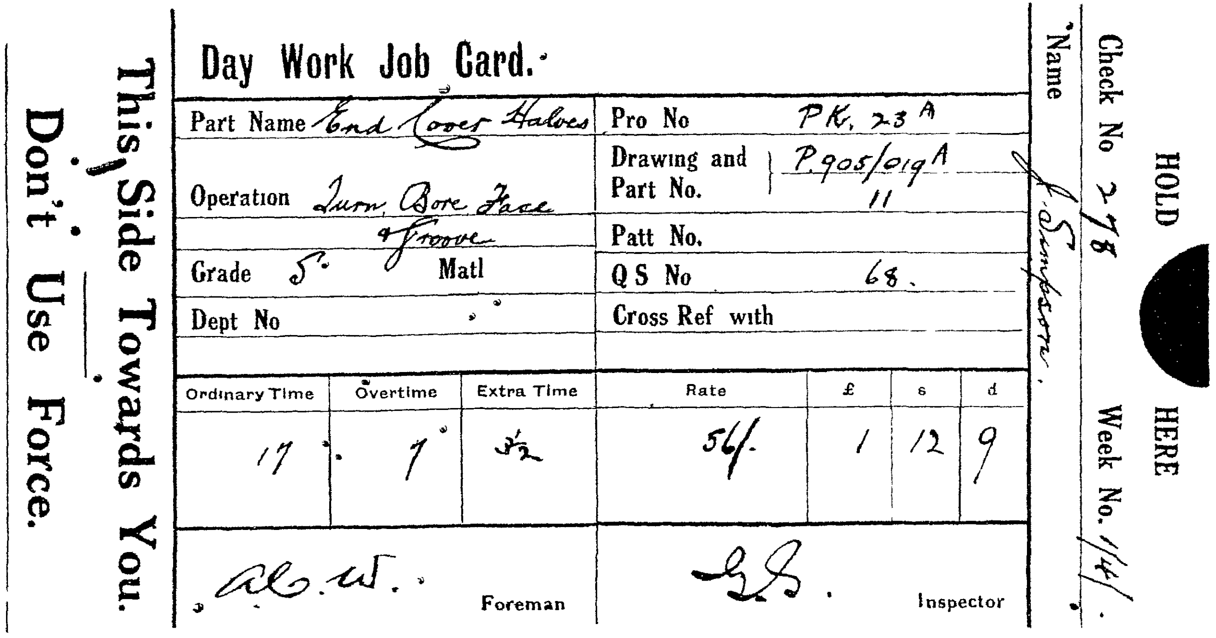
Contract *Messrs Brown & Co*

Date *18th July*, 19 –

Drawing No	Part	Q S No	Quantity	DESCRIPTION	Stores Folio	T	C	Q	lbs	Rate	£	s	d
L 1180 *M* 102 *A*	3	12	4 *feet*	¾ *in* × 045 *in* *Spring Phosphor Bronze*	7				½	1/6 *lb*			9

Foreman *B B*	Shop 7	Approved *K*	Received by *E E*	Posted by *T R*	Date 19/7/—	Entered by *M*	Entered on Costs by *W W*

MATERIAL RETURNED TO STORES



HOLD HERE

Check No 278 Week No. 1/4/.

Name J. Simpson.

Day Work Job Card.

Part Name	End Cover Halves	Pro No	PK. 23A
Operation	Turn, Bore Face & Groove	Drawing and Part No.	P.905/019A 11
		Patt No.	
Grade	5. Matl	Q S No	68.
Dept No		Cross Ref with	

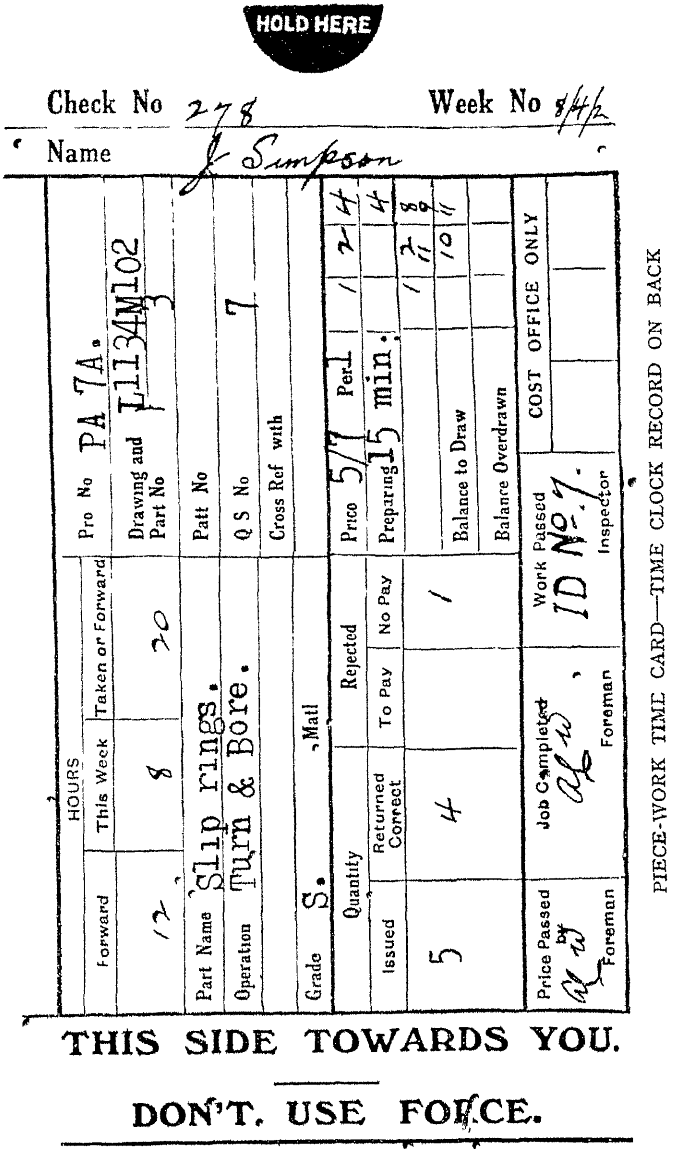
Ordinary Time	Overtime	Extra Time	Rate	£	s	d
17	7	3½	56/-	1	12	9

Foreman Inspector

This Side Towards You.

Don't Use Force.

DAY WORK TIME CARD—TIME CLOCK RECORD ON BACK



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Check No 278 Week No 8/4/2

Name J. Simpson

HOURS

Forward 12

This Week 8

Taken or Forward 20

Pro No PA 7A.

Drawing and Part No L1134M102 3

Part Name Slip rings.

Patt No

Operation Turn & Bore.

Q S No 7

Cross Ref with

Grade S. Mall

Price 5/7 Per 1 | 1 2 4

Preparing 15 min. | 4

1 2/11 8/9

Balance to Draw | 10 11

Balance Overdrawn

COST OFFICE ONLY

Quantity

Issued 5

Returned Correct 4

Rejected

To Pay

No Pay 1

Price Passed by AW Foreman

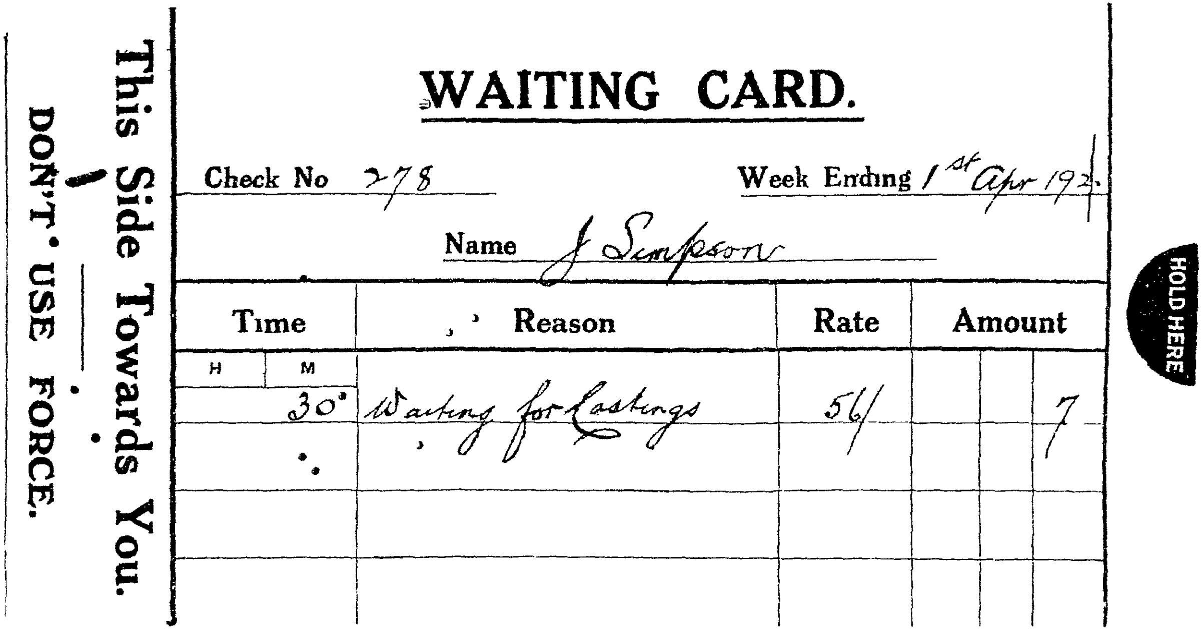
Job Completed AW Foreman

Work Passed ID No. 7. Inspector

PIECE-WORK TIME CARD—TIME CLOCK RECORD ON BACK

THIS SIDE TOWARDS YOU.

DON'T. USE FORCE.



WAITING CARD.

Check No 278 Week Ending 1st Apr 192

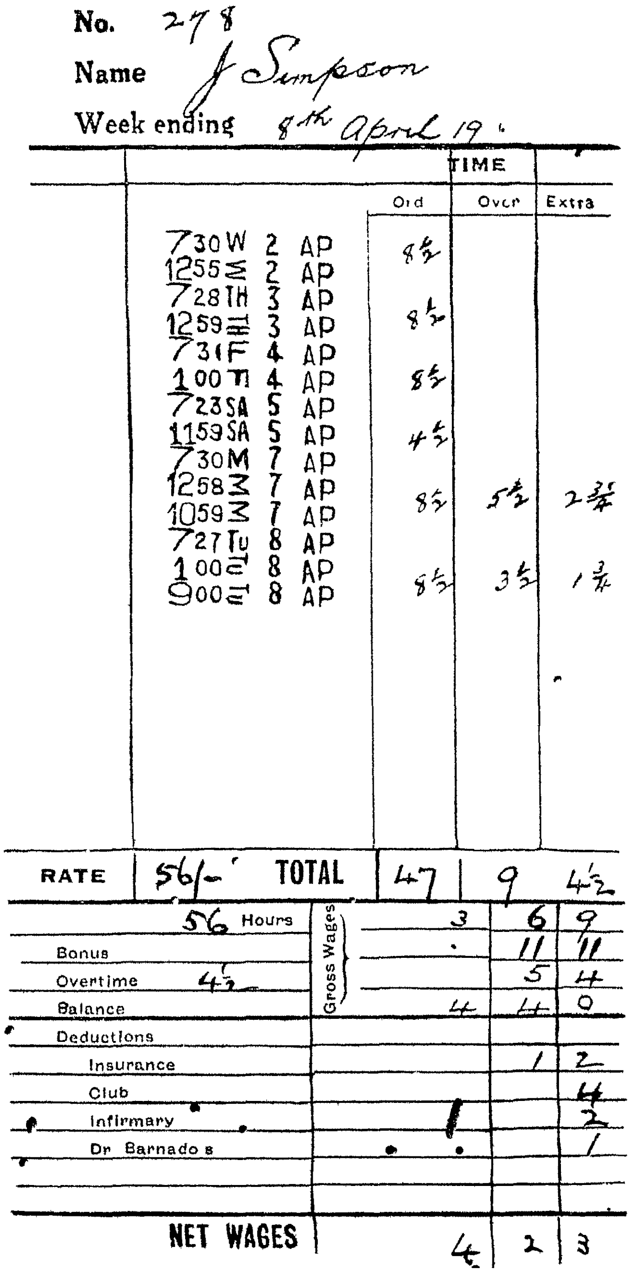
Name J Simpson

Time		Reason	Rate	Amount		
H	M					
	30	Waiting for Castings	56/			7

This Side Towards You.

DON'T USE FORCE.

TIME CARD WAITING TIME—TIME CLOCK RECORD ON BACK



No. 278
Name J Simpson
Week ending 8th April 19

	TIME Ord	Over	Extra
7 30 W 2 AP	8½		
12 55 W 2 AP			
7 28 TH 3 AP			
12 59 TH 3 AP	8½		
7 31 F 4 AP			
1 00 F 4 AP	8½		
7 23 SA 5 AP			
11 59 SA 5 AP	4½		
7 30 M 7 AP			
12 58 M 7 AP	8½	5½	2¾
10 59 M 7 AP			
7 27 TU 8 AP			
1 00 TU 8 AP	8½	3½	1¾
9 00 TU 8 AP			

RATE 56/- TOTAL	47	9	4½
56 Hours (Gross Wages)	3	6	9
Bonus	·	11	11
Overtime 4½		5	4
Balance	4	4	0
Deductions			
Insurance		1	2
Club			4
Infirmary			2
Dr Barnado s			1
NET WAGES	4	2	3

WEEKLY TIME CARD

WAGES SHEET

Check No	Rate	Name	Hours		Employers Insurance		Day Work	Piece Work	Deductions					Gross	Nett
			Ordinary	Over	H	U			Club	Dr B Home	Workers Insurance H	Workers Insurance U	Infirmary		
	£ s d				d	d	£ s d	£ s d			d	d	d	£ s d	£ s d
276	[illegible] 16 –	*Brown*	47	17	5	10	3 16 3	—	2	1	5	9	2	3 16 3	3 14 [illegible]
277	3 – 6	*Jones*	4½		5	10	5 10	3 – 10	2	1	5	9	2	3 6 8	3 5 1
278	2 16 –	*Simpson*	47	13½	5	10		4 4 –	4	1	5	9	2	4 4 –	4 2 3

BURROUGHS PAY-ROLL MACHINE SHEET

DEVELOPMENT (*a*) **Drawings** (*b*) **Patterns** (*c*) **Tools**

Date 19*th* *Dec*, 19--

Section *Frequency Changer Set*, 9375 *K V A* Dev Pro No *D A* 5

Job *W J Robinson & Co*

		Estimate			
a, *b* or *c*	Short Description	Materials	Wages	Charges	Total
	Drawings	—	£100	£75	£175
	Patterns	£50	£100	£100	£250
	Tools	£150	£300	£300	£750
					£1,175

Form to be returned to Cost Dept as soon as WORK COMPLETED

Date completed__________19___

Submitted by_____*J B*____________

Dept Supt __________*H C*__________

Works Manager______*R K*__________

Approved

WORKS EXPENSE AUTHORIZATION—DEVELOPMENT

CAPITAL

Section *Controller* Shop 15 Date *31st March* 19—

Job *Supply and Installing of one Grinding Machine* Pro No 5109/3

Estimate			Materials Required			Purchases Required	
£	[illegible]	d	Quantity	Description	If in Stock	Firm	Order
370			*One*	*Grinding Machine, to be in accordance with quotation herewith*	*No*	*Messrs James & Co London*	

Labour						
£	s	d	By Dept	Est by	Date Finished	Foreman
10	–	–	*No 10 Yard*	*R N*		
4	10	–	*No 1 Main Bays*	*A M*		

Dept Manager ____*C N*___

Works Manager ____*R R*____

Managing Director ____________

Date Completed and Pro No withdrawn ____________

Work approved ____________

NO WORK MUST BE DONE UNTIL SIGNED FORMS ARE DELIVERED

WORKS EXPENSE AUTHORIZATION—PLANT

SPECIAL TOOLS

Date 18*th* *June* 19—

Section *Main Bays*

Shop *No* 1

W D O Pro No *D R* 2*C*/99

Job *Drilling Jig for Brush Holder Holes in D R* 93 *Motor Frame*

Drg *P I W* 70 *M* 222

ESTIMATE			MATERIALS REQUIRED			PURCHASES REQUIRED	
£	s	d	Quantity	Description	If in Stock	Firm	Order
1	–	–	1	*Item* 1 *M S Plate,* 23½ *in* × 15¼ *in* × ⅛ *in*	*Yes*		
			1	„ 2 *C I Patt No P I W* 70 *M* 222/2	„		
			1	„ 3 *M S* 6⅝ *in* × 1⅜ *in* × — *in*	„		
			1	„ 4 *M S* 3¼ *in* × 1⅝ *in* × — *in*			
			1	„ 5 *M S* 3 *in* × 1⅜ *in dia*			

LABOUR

£	s	d	By Dept	Est by	Date Finished	Foreman
1	10	–	No 6 *Tool*	*M M*		
	7	6	*No* 20 *Pattern*	*W A*		
	5	–	*No* 3 *Die*	*F N*		

Submitted by	*S M*
Dept Manager	*C N*
Works Manager	*R R*
Date Completed and Pro No withdrawn	
Work approved	

NO WORK MUST BE DONE UNTIL SIGNED FORMS ARE DELIVERED

WORKS EXPENSE AUTHORIZATION—TOOLS

REPAIRS (Over £5) Date *1st March* 19—

Section *Pattern Shop* Shop 20 Pro No 3020/6

Job *Repairs to Box Shop damaged by Works Crane*

ESTIMATE			MATERIALS REQUIRED			PURCHASES REQUIRED	
£	s	d	Quantity	Description	If in Stock	Firm	Order
	3	–		*Iron Cups, Bolts, etc*	*Yes*		
	14	–		*Wood as necessary*	„		
	5	–		*Electrical Material*	„		

LABOUR						
£	s	d	By Dept	Est by	Date Finished	Foreman
1	5	–	*No 20 Pattern*	*W 1*		
	5	–	*No 3 Die*	*E N*		
3	12	–	*No 18 Electrical Maintenance*	*R O*		

Submitted by	*L W*
Dept Manager	*J M*
Works Manager	*R R*
Date Completed and Pro No withdrawn	
Work approved	

NO WORK MUST BE DONE UNTIL SIGNED FORMS ARE DELIVERED

WORKS EXPENSE AUTHORIZATION—REPAIRS

STORES

Survey Dates					Order Point	30	Description *Phosphor*
Signed					Order Qty	100	

Appropriations			Ordered				Receipts			
Pro	Q S	Qty	Date	From	O No	Qty	Date	From	O No	Qty
										lbs
PA 1A	12	60′ 0	7/5/2–	*Dunn & Co*	*PE* 1287	100 0	17/5/––	*Dunn & Co*	*PF* 1287	10 12½
							18/7/––	*Cr P4 7A*		4 1

(Showing Purchases and Allocations,

LEDGER

Bronze, ¾ in × 045	Stores No

				Issues							Stock				
Rate	£	s	d	Date	To	Qty	Rate	£	s	d	Qty	Rate	£	s	d
						lbs					lbs				
1/6		18	9	27/6/—	P 4 7A	60 7½	1/6		11	3					
			9								44′ 5½	1/6		8	3

Receipts, Issues and Stock)

COST ANALYSIS

Order No *P A* 15

Customer *Brown & Co*

Type *D C 93, P T Motor* Output 12 *h p*

Volts 440 R P M 500

Extras *Baseplate and Bolts*

Ref	Part	No	Material							Labour			Works Expense			Works Cost			Cost each			
			Wght			@	£	s	d													
	CARCASE	1	5	–	–	25/-	6	5	–							6	5	–				
	Bore and Turn										15	6	1	3	3	1	18	9				%
	Plane										3	2		1	9		7	11				150
	Drill and Tap										1	6		2	3		3	9				
							6	5	–	1		2	1	10	3	8	15	5				
	POLES —																					
	(Stampings)	4		1	12	6d	1	–	–							1	–	–				%
	Stamp out										1	3		2	6		3	9				200
	Build										2	6		3	4		5	10				133⅓
	Fettle & Trim										2	–		2	8		4	8				
	Drill and Tap										1	6		2	3		3	9				
							1	–	–		7	3		10	9		18	–				
	AUX POLES																					
	(Bar)	4			12				6									6				
	Saw											3			5			8				
	Turn											6			9		1	3				
	Drill and Tap											3			5			8				
	Mill											4			6			10				
									6		1	4		2	1		3	11				
	EYEBOLTS,																					
	Screws, etc							3	6								3	6				
	PAINTING										6	–		7	6		13	6				
								3	6		6	–		7	6		17	–				
	TOTAL COST	£					7	9	–	1	14	9	2	10	7	11	14	4				
	BEARING END																					
	SHIELDS——																					
	Pulley End				28	24/-		6	–								6	–				
	Bore and Turn										2	6		3	9		6	3				
	Drill and Tap										1	–		1	6		2	6				
								6	–		3	6		5	3		14	9				
	COM END				21	24/-		4	–								4	–				
	Bore and Turn										2	–		3	–		5	–				
	Drill and Tap																					

DETAILED COSTING OF ELECTRIC MOTOR

COST DETAIL LEDGER

Pro No

JOB 1,250 *K V A Alternator*

Brown

P A 12

Date	Fo	Purchases						Petty Cash, etc			Stock Material			Wages			On Cost			Total		
		General			Inter Works																	
		£	s	d							£	s	d	£	s	d	£	s	d	£	s	d
19— *A* July 14		46	–	5							8	–	3	5	19	9	4	15	2	64	15	7
Aug		62	11	3							29	13	7	4	12	6	4	19	9	101	17	1
Sept		8	12	5							30	9	10	5	18	11	8	12	6	53	13	8
Oct											174	2	7	51	6	9	64	7	6	289	16	10
Nov			7	2							5	15	4	65	15	7	96	19	6	168	17	7
Dec												18	2	13	19	–	18	7	4	33	4	6
																				£712	5	3
19— *B* Aug		13	12	11							1	19	4		16	4		16	4	17	4	11
Sept		3	9	5							2	12	9	1	19	7	2	19	4	11	1	1
Oct			5	–							7	10	3	3	7	7	3	19	4	15	2	2
Nov			3	8							3	14	–	13	9	7	16	12	–	33	19	3
Dec			2	2							2	7	4	1	14	8	2	3	8	6	7	10
																				£83	15	3
19— *C* Aug			13	10							2	3	10		5	4		6	8	3	9	8
Sept											9	10	7	2	1	8	2	15	11	14	8	2
Oct												5	5	6	8	–	9	1	7	15	15	–
Nov			18	2							13	11	–		16	8	1	2	3	16	8	1
Dec			19	6								7	5	3	6	11	5	–	1	9	13	11
																				£59	14	10

COST LEDGER—MONTHLY POSTINGS FROM ABSTRACTS

COST CONTROL

H O Order *S C* × 56536/7168 *E P S* Pro No *P A* 12
Date 12*th June*, 19— Date 13*th June*, 19—
Customer *Brown & Co*
Description of Order and Quantities 1-250 *K V A Alternator*

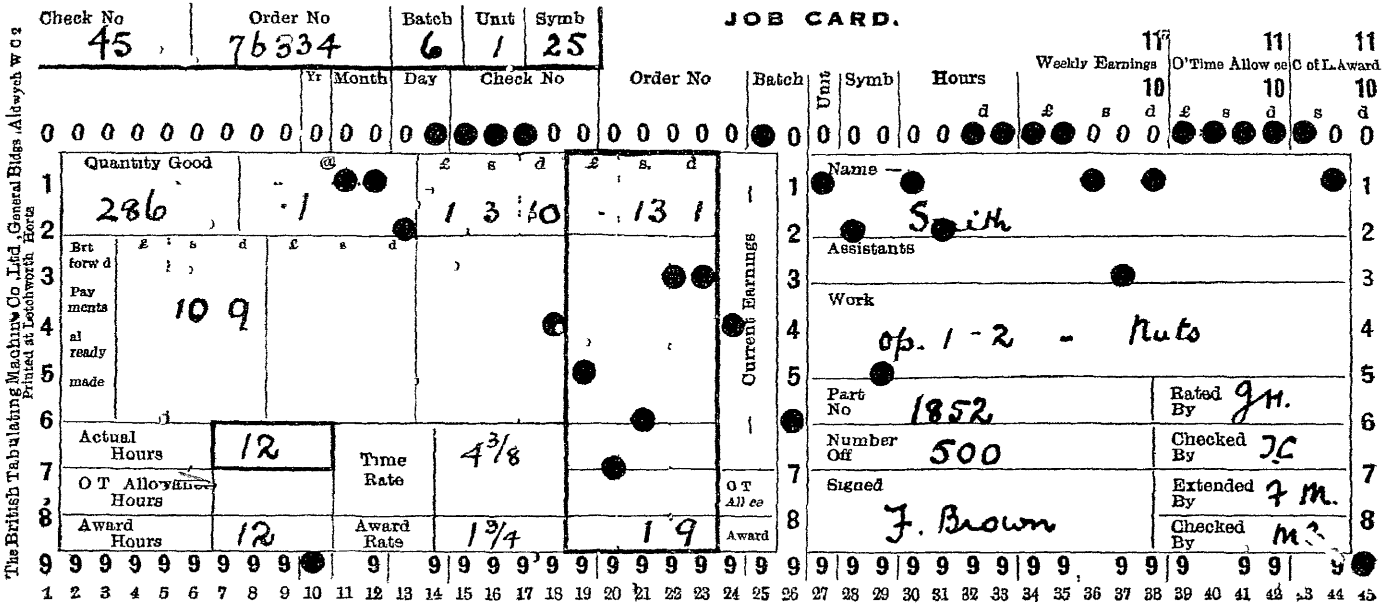
Date	Estimate		COST					
		Amount	Purchases	Petty Cash, etc	Stock Materials	Wages	On Cost	Development
19—								
June 16						6 2	4 5	
July			46 – 5		8 – 3	20 19 7	17 7 –	
Aug			82 3 5		34 16 10	9 13 11	9 11 6	
Sept			12 1 10		43 11 11	10 – 2	14 7 9	
Oct			5 –		189 9 6	65 14 8	83 7 10	
Nov			12 4 3		29 16 2	97 1 5	138 16 11	
Dec			40 17 2	14 7	6 10 2	35 5 9	39 – 3	
			193 12 1	14 7	312 4 10	239 1 8	302 15 8	

COST SUMMARY—MONTHLY POSTINGS FROM SUMMARY

LEDGER

Total			Cost Detail Transfers					CREDITS									
			Sub	Heading	Amount			Date		Description	Fol	W C P			Sale		
			A	Alternator	712	5	3										
	10	7	B	Exciter	83	15	3										
9	7	3	C	Regulrs	59	14	10										
136	5	8	D	Spare Arm	31	5	11										
80	1	8	E	Drawings	23	9	7										
338	17	6	F	Patterns	14	3	8										
27	18	9	G	Tools	14	19	4										
122	7	11	X	Testing	19	19	7										
1 048	8	10	Y	Packing	80	17	2										
			Z	Freight	4	18	3										
					1 048	8	10	Dec	1/19		121/533	1 048	8	10	1 017	-	-

OF ABSTRACTS DETAILS FROM COST LEDGER



JOB CARD.

Check No 45
Order No 76334
Batch 6
Unit 1
Symb 25

Quantity Good 286
@ ·1
£ s d 1 3 10
£ s d ·13 1
Brt forw d Payments already made 10 9
Actual Hours 12
O T Allowance Hours
Award Hours 12
Time Rate 4 3/8
Award Rate 1 3/4
Award 1 9
Current Earnings
O T All ce

Name — Smith
Assistants
Work Op. 1-2 - Nuts
Part No 1852
Number Off 500
Signed J. Brown
Rated By JH.
Checked By JC
Extended By JM.
Checked By M3

Yr
Month
Day
Check No
Order No
Batch
Unit
Symb
Hours
Weekly Earnings
O'Time Allowance
C of L Award
£
s
d
The British Tabulating Machine Co, Ltd, General Bldgs, Aldwych W C 2
Printed at Letchworth Herts

HOLLERITH SYSTEM JOB CARD, SHOWING WRITTEN DETAILS AND CORRESPONDING PUNCHED RECORD

See page 160

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